OCRA (The Occupational Repetitive Actions) methods: OCRA Index and OCRA Checklist

**General description and development of the method**

OCRA is a synthetic index describing risk factors of repetitive actions at work with one figure. The OCRA index quantifies the relationship between the daily number of actually performed by the upper limbs in repetitive tasks, and corresponding number of recommend actions:

\[
OCRA = \frac{\text{total number of technical actions actually performed during the shift}}{\text{total number of recommended technical actions during the shift}}.
\]

The number of recommended actions is counted from observed actions multiplied by weights due to the following conditions: muscle force, posture of the parts of the upper limb, "additional factors", lack of recovery periods, and the daily duration of the repetitive actions.

A simplified OCRA checklist is aimed to be used as a preliminary screening tool. (Occhipinti 2005)

OCRA methods have been developed in Italy to analyze worker's exposure to tasks featuring various upper-limb injury risk factors. They are based on a consensus document of the International Ergonomics Association (IEA) technical committee on musculoskeletal disorders and on the procedure recommended by the NIOSH for calculating Lifting Index (Occhipinti 2005) (Occhipinti 1998). Method was described first time in literature in 1996 (Occhipinti 1996). OCRA checklist is simpler and not so accurate than OCRA index. It can be used in risk evaluation to produce the fist "map of risks".


**Exposure descriptors**

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Description of exposure</th>
<th>magnitude/amplitude</th>
<th>duration</th>
<th>frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>posture</td>
<td></td>
<td>X .</td>
<td>X .</td>
<td>X .</td>
</tr>
<tr>
<td>movements</td>
<td></td>
<td>X .</td>
<td>X .</td>
<td>X .</td>
</tr>
<tr>
<td>(external) force</td>
<td>Muscular effort assessed by CR-10 Borg scale</td>
<td>X .</td>
<td>X .</td>
<td>X .</td>
</tr>
<tr>
<td>vibration</td>
<td>Use of vibrating tools</td>
<td>.</td>
<td>.</td>
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<tr>
<td>contact forces</td>
<td>Localized compressions on anatomical structures of the hand</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>or forearm</td>
<td></td>
<td></td>
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</table>

Others: exposure to cold, slippery surfaces of objects. Lack of proper recovery periods. Other "additional factors" are also considered e.g the requirement for extreme precision, the use of inadequate gloves, required use of rapid or sudden wrenching movements.
Resource demands and usability

OCRA checklists and OCRA index softwares:

Equipment needed

"Both methods can be carried out using just a pen and paper. The OCRA index method, however, often requires the use of a video camera that allows films to be viewed in slow motion. Both methods have specialized software available for loading and processing the data and results" (Occhipinti 2005)

Process of coding and analysis

General approach:
1. Pinpointing the repetitive tasks characterized by those cycles with significant durations
2. Finding the sequence of technical actions in a representative cycle of each task
3. Describing and classifying the risk factors within each cycle
4. Assembly of the data concerning the cycles in each task during the whole work shift, taking into consideration the duration and sequences of the different tasks and of the recovery periods
5. Brief and structured assessment of the risk factors for the job as a whole (exposure or risk index)

Computing of OCRA index:

Suitable weighting factors are selected for force, postures, “additional factors”, and duration. The factors are multiplied with frequency and duration of each task and summed up to describe the whole job/task.

Output type/level (risk assessment)

OCRA index

Criteria to help the evaluator to make decision

The method provides an OCRA risk index score which can be compared to three action levels: red (= risk), yellow (= very low risk), and green (= no risk). (Colombini 2006). New critical values of the OCRA index were documented in Italian in 2004 and in English 2007 (Occhipinti 2004, Occhipinti 2007)

Fields of the working life where the method has been used

Ceramic ornament finishing, auto body sanding, door and window sanding, supermarket check-out, preserved vegetables packing, auto seta assembly & sewing, meat processing, manual feeding in ceramic line (Grieco 1998); manufacturing industry (Occhipinti 2007); ironwork industry (Najarkola 2006); toll collectors (Capodaglio 1998); pottery manufacturing (Clerici 2005); industry workers and cleaners (Colombini 2004); industry workers (d’Angelo 2006, Spigno 2003, Zecchi 1998); construction workers (Filosa 2005);
### Validity

#### Face validity / Contents validity

Does the method seem to be valid for the aimed purpose?

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1. The contents of the method is such that a relevant assessment can be expected</td>
<td>x</td>
</tr>
<tr>
<td>Comments: Common risk factors for upper limb disorders included</td>
<td></td>
</tr>
<tr>
<td>2. Items to be observed have a sound basis</td>
<td>x</td>
</tr>
<tr>
<td>3. Sound operationalization of the items to be observed</td>
<td>x</td>
</tr>
<tr>
<td>Comments: Description of the criteria not very clear</td>
<td></td>
</tr>
<tr>
<td>4. Sound process to collect data</td>
<td>x</td>
</tr>
<tr>
<td>Comments: The Index is more complicated and more time consuming than the Checklist.</td>
<td></td>
</tr>
<tr>
<td>5. Sound process to get the output of the collected data</td>
<td>x</td>
</tr>
<tr>
<td>Comments: Multipliers are hypothetical and therefore can include bias. Counting of index is complex.</td>
<td></td>
</tr>
<tr>
<td>6. Output can help in decision making</td>
<td>x</td>
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</table>

#### Concurrent validity

How well does the method correspond with more valid method/s?

1) **Comparison of the checklists OCRA, OREGE, Strain Index, ACGIH** (Apostoli 2004) (Italian, English summary)
   - 12 workstations assessed from video
   "The comparison revealed variability between the methods in situations of middle risk, while the methods substantially gave similar results in situations without any risk or with high risk. Methods could not reveal every component of the risk in a reproducible and univocal way also when the risk assessment was accordant. It is necessary a following analytical evaluation of each risk factor contributing to define the sintetic index."

2) **Strain Index vs. RULA, REBA, ACGIH TLV, and OCRA** (Jones 2007)
   NOTE! Estimations of risk level based on data of technical measurements
   Comments: It is hard to see the reference methods as “more valid method”
"Predictive validity"
How well has the risk-estimation of the method been shown to be associated with or predicting musculoskeletal disorders (MSDs)?

**Prevalence of upper limb disorders compared with OCRA** (Occhipinti 2007); (Occhipinti 2004)
There is a high degree of association between OCRA Index and Prevalence of workers with one or more UL-WMSDs.

**Intra-observer repeatability (within observers)**
- No formal studies

**Inter-observer repeatability (between observers)**
- No formal studies

**Conclusions**

**Strengths of the method**
- Takes into account recovery periods. Gives an accurate (?) output
- OCRA makes it possible to compare different work contexts.
- Seems to be a useful tool to design or redesign of the workplace as well as job rotation and organization.
- Estimates the workers risk level by considering all the repetitive tasks in a complex job.
- The OCRA Checklist is easy and quick to use.
- Describes the risks related to exposure in terms of green-yellow-red (easy to understand).

**Limitations in the use of the method**
- Multipliers are hypothetical; description of the criteria unclear; validity and repeatability not studied. The user have to assign variable scores for "additional" factors.
- The use is time consuming.
- The method does not consider psychosocial factors.
- OCRA Checklist allows only an estimation of exposures, not a precise risk evaluation.
- It needs a well trained observer. The training may take 2-3 days and some talent.

**To whom can this method be recommended?**
Occupational safety/health practitioners, ergonomists

**References**
Colombini D & Occhipinti E. [Results of risk and impairment assessment in groups of workers exposed to repetitive strain and movement of the upper limbs in various sectors of industry]. Med Lav. 2004;95(3):233-46.


Grieco A. Application of the concise exposure index (OCRA) to tasks involving repetitive movements of the upper limbs in a variety of manufacturing industries: preliminary validations. Ergonomics. 1998;41(9):1347-56.


