Vibration Injury Network

Research Network on Detection and Prevention of Injuries due to Occupational Vibration Exposures

Guidelines for Hand-Transmitted Vibration Health Surveillance

Appendix H1A to Final Report

May 2001

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Contents

1. **Current knowledge on hand-transmitted vibration injuries**

Prolonged exposure to hand-transmitted vibration from powered processes or tools is associated with an increased occurrence of symptoms and signs of disorders in the vascular, neurological and osteoarticular systems of the upper limbs (1, 2). The complex of these disorders is called ***hand-arm vibration syndrome***. The *vascular component* of the hand-arm vibration syndrome is represented by a secondary form of Raynaud's phenomenon known as vibration-induced white finger; the *neurological component* is characterised by a peripheral, diffusely distributed neuropathy with predominant sensory impairment; the *osteoarticular component* includes degenerative changes in the bones and joints of the upper extremities, mainly in the wrists and elbows. The vascular and osteoarticular disorders caused by hand-transmitted vibration are included in a European schedule of recognised occupational diseases (3). An increased risk for upper limb muscle and tendon disorders, as well as for nerve trunk entrapment syndromes, has also been observed in workers who use hand-held vibrating tools. A few studies have reported that exposure to hand-transmitted vibration can decrease muscular strength in the hands and arms, aggravate the risk of noise-induced hearing loss, and provoke disturbances of the central nervous system (1, 2). However, the relation between these disorders and exposure to hand-transmitted vibration is still unclear.

2. **Prevention measures**

The prevention of injuries or disorders caused by hand-transmitted vibration requires the implementation of administrative, technical and medical procedures. Guidelines on preventive procedures are included in some ISO and European standards and reports (4, 5, 6, 7, 8), in the NIOSH document on criteria for a recommended standard on occupational exposure to hand-arm vibration (9), in the report of the Faculty of Occupational Medicine of the Royal College of Physicians on hand-transmitted vibration (10), and in review papers and chapters of books (2, 11, 12).

Prevention includes technical measures aimed at elimination or reduction of hand-transmitted vibration at the source, appropriate information and advice to employers and employees, instruction to adopt safe and correct work practices, and medical preventive guidance.

3. **Health surveillance**

3.1 **Aims of health surveillance**

The aims of *health surveillance* are to inform the workers on the potential risk associated with vibration exposure, to assess health status and to diagnose vibration-induced disorders at an early stage. The employers should provide a health monitoring program for all workers occupationally exposed to hand-transmitted vibration according to the legislation of the country. Appropriate facilities for the health surveillance of the vibration-exposed workers should be also provided by the employers. The management of a health surveillance program for workers exposed to hand-transmitted vibration should be under the supervision of a physician with a speciality in occupational medicine or at least with a certified training in occupational health. Practical routine procedures for the application of the health surveillance program may be carried out by allied health professionals with experience in occupational health problems. The workers should be informed by the health care staff that their personal and health data will be confidentially treated and preserved.

Pre-placement medical assessment and periodic clinical examinations at regular intervals should be conducted for each worker who uses vibrating tools at the workplace. It should be noted that no one sign or symptom is specific of the hand-arm vibration syndrome and that the clinical features of the syndrome may be found in several other disorders or diseases. As a result, the occupational health physician should consider various clinical and laboratory tests in order to perform a differential diagnosis when the case history and the physical examination suggest the presence of symptoms or signs of the hand-arm vibration syndrome.

3.2 **Pre-placement medical examination**

A pre-placement medical examination should be offered to each worker who will handle vibrating tools on the job. The main purposes of pre-placemenent health assessment are to make the worker aware of the hazards connected with the use of vibrating tools, to obtain baseline health data for comparison with the findings of subsequent periodical health examinations, and to verify the presence of pathological conditions which may increase the risk of adverse health effects due to exposure to hand-transmitted vibration.

The pre-placement medical evaluation must be performed according to the principles and practice of occupational medicine and will include the case history, a complete physical examination and, if necessary, screening tests and special diagnostic investigations according to the clinical judgement of the physician.

3.2.1 ***The case history***

The case history shoul focus on:

- The family history, with particular reference to vascular disorders (e.g. arterial hypertension, vasospastic syndromes, constitutional white finger), metabolic diseases (e.g. diabetes, gout), and immunologic disorders (e.g. rheumatoid arthritis).
- The social history, including smoking habit and alcohol consumption.
- The work history, with particular reference to past and current occupations with exposure to hand-transmitted vibration, details about the types of vibrating tools used, the daily and total duration of exposure to hand-transmitted vibration, and previous jobs with exposure to neurotoxic or angiotoxic agents. Leisure activities involving the usage of vibrating tools should be also investigated.
- The personal health history, with details of acute or chronic disorders in the body organs, past and present vascular, neurological and musculoskeletal disturbances in the hand-arm system, any injuries or surgery to neck and upper limbs, and use of medicines; symptoms of whiteness and/or blueness, tingling and numbness, as well as their distribution, in the fingers and hands, must be carefully investigated.

Note 1: information on personal, social, work, and health histories may be obtained by means of a standardised questionnaire. The questions should be validated and the answers easy to be analysed. In field surveys, a short questionnaire including a few items to determine if exposure to hand-transmitted vibration causes health problems (see Appendix Ia), may be either self-administered or administered by occupational health professionals (e.g. nurses, medical assistants). A comprehensive questionnaire including detailed personal, work and health information, may be required if the aims of the investigation are the clinical and/or medico-legal evaluation of the worker or the assessment of exposure-response relation in epidemiologic studies (see Sections 1 to 5 of Appendix Ib). Since the management of such a

questionnaire requires a substantial medical background, the questionnaire should be administered by an occupational health physician.

Note 2: at the first clinical examination, particular attention should be paid to any condition which may aggravate the effects of exposure to hand-transmitted vibration (e.g. constitutional tendency to white finger, some forms of secondary Raynaud's phenomenon, past injuries of the upper limbs causing circulatory disturbances or deformity of bones and joints, neurological disorders). The use of some drugs which can affect peripheral circulation (e.g. β-blocking agents) should be recorded. Appendix II reports a list of possible medical conditions that may increase the risk of upper limb disorders in workers exposed to hand-transmitted vibration.

Note 3: as part of the employee education and health surveillance, the occupational health professional should advise the worker to wear adequate clothing to keep the entire body warm, and to avoid or minimise the smoking of tobacco. Gloves are useful to protect the fingers and hands from traumas and to maintain them warm. To be effective at attenuating vibration, gloves shall succeed the test required by the international standard ISO 10819 (13).

Note 4: according to the report of a working group at the Stockholm Workshop 94 (14), a medical interview is the best available method of diagnosing vibration-induced white finger (VWF). Therefore, in addition to the findings of the questionnaire investigation, the anamnestic diagnosis of VWF should be validated with a medical interview. The following minimal requisites for the anamnestic diagnosis of currently active VWF in a medical interview have been suggested (14): (a) cold provoked episodes of well demarcated distal whiteness in one or more fingers [a history of cyanosis (blueness) alone is not acceptable immediately as diagnostic discolouration of VWF and further investigation for other secondary causes and/or diseases is recommended]; (b) first appearance of white finger after start of professional exposure to hand-arm vibration and no other probable causes of Raynaud's phenomenon; (c) VWF is currently active if episodes have been noticed during the last two years. If no episodes have occurred for more than two years, VWF has ceased, provided there has been no significant change in cold exposure.

Note 5: observation of an attack of white finger is an important diagnostic marker. Vibration-exposed workers should be instructed to report and demonstrate white finger when it first occurs or if there is deterioration. Physicians and their staff should record these pathological events.

3.2.2 ***The physical examination***

A comprehensive physical examination, with special reference to the peripheral vascular, neurological, and musculoskeletal systems, should be performed by a qualified physician (see Section 6 in Appendix Ib).

In general, the presence of skin callosities, Dupuytren's contracture, and scars from previous traumatic injuries or surgery in the hands should be described. Any abnormality of the upper limbs should be also reported.

The examination of the *vascular system* should include evaluation of skin colour, temperature and trophism in the fingers and hands; report of the presence, strength and simmetry of the brachial, radial, ulnar, and posterior tibial pulses; measurement of systolic and diastolic pressures in both arms; and measurement of pulse rate.

The integrity of the *peripheral nervous system* should be screened by a routine neurological examination including sensation (pain, light touch, temperature, and vibrotactile perception) and reflexes in the upper and lower limbs.

The physical examination of the *musculoskeletal system* in the upper limbs should include inspection for local swelling, muscle wasting or atrophy, and bone and joint deformities; palpation of muscle tendon and insertions; evaluation of range of movement and muscle strength.

3.2.3 ***Clinical tests***

Further assessment of the anatomical and functional integrity of the peripheral vascular, neurological, and musculoskeletal systems can be performed by means of simple clinical tests. In general, the validity of these clinical tests is questionable and their sensitivity and specificity are reported to be low. Nevertheless, such tests may be helpful both to support the presence of disorders of the hand-arm vibration syndrome and to assess clinically their progression.

Clinical tests for the *peripheral vascular system* include the Lewis-Prusik test (for the assessment of capillary circulation), the Allen test (for the patency of the palmar

arches and the digital arteries), and the Adson test (for the vascular component of the thoracic outlet syndrome).

Clinical tests for the *peripheral nervous system* include the evaluation of manual dexterity (e.g. coin recognition and pick up), the Roos test (for the neurogenic component of the thoracic outlet syndrome), the Phalen's test and the Tinel's sign (for carpal tunnel compression).

Clinical tests for the screening of the peripheral neurological and vascular systems are described in more detail in Appendix III.

Standardised criteria for the clinical diagnosis of several musculoskeletal disorders of the neck and upper limbs, as well as of entrapment neuropathies, are reported in Appendix IV.

3.3 **Periodic medical examination**

The pre-placement examination should be followed by periodic health re-assessment with a regular interval. Periodic medical examination should be made available at least annualy to all workers who use vibrating tools at the workplace. It has also been suggested that re-assessment should be made six-monthly for the first year, to detect those individuals who may be especially sensitive to vibration, and thereafter annualy (10).

Any change in vibration exposure at the workplace should be reported by the employer. If an increase in vibration exposure or a change in health status have occurred, the medical re-examination should be offered at shorter intervals at the discretion of the attending physician.

At the periodic medical examination, which should be conduceted in the same way as described in 3.2.2 and 3.2.3, any change in work practices with vibrating tools should be reported in a follow-up questionnaire (see Section 1 in Appendixes Ic or Id). Moreover, any illness or injury occurred since the last examination, any symptom possibly related to vibration exposure, as well as the findings of the physical examination should be also reported.

The reported findings for the individual should be compared with previous examinations.

The peripheral neurological and vascular signs and symptoms noted during the examination should reported and staged according to the Stockholm scales (15, 16),

(see Section 6 in Appendix Ia, Section 7 in Appendix Ib, Section 3 in Appendix Ic, and Section 4 in Appendix Id).
Grouped data should be compiled periodically and reported to management and representatives of employees.

3.4 **Screening tests and special diagnostic investigations**

Screening tests and special diagnostic investigations should be decided by the physician on the basis of the worker's symptoms and the results of the clinical examination. Screening and special investigations may be required to establish a clinical diagnosis of the hand-arm vibration syndrome, to achieve accurate staging of the syndrome, to make differential diagnosis, and for medico-legal purposes.
These investigations may be performed by occupational health professionals with appropriate expertise or by specialists in the relevant medical disciplines.
Various laboratory diagnostics of vascular and neurological symptoms induced by hand-transmitted vibration have been discussed in the Stockholm Workshop 94 and consensus reports have been published in an issue of Arbete och Hälsa, 1995 (14, 17).

3.4.1 *Vascular investigations*

The vascular assessment of the hand-arm vibration syndrome is mainly based on cold provocation tests with visual inspection of changes in finger colour, recording of recovery times of finger skin temperature, and/or measurement of finger systolic blood pressure.
The observation of a finger blanching attack after cold water immersion or the detection of an abnormal digital blood pressure after a standardised cooling procedure (e.g. zero pressure or a digital pressure at 10°C <60-70% of the pressure at 30°C) are the most supportive objective tests for a diagnosis of cold-induced Raynaud's phenomenon (18). It should be noted that a negative cold test does not exclude the diagnosis of Raynaud's phenomenon in a subject with a reliable anamnestic history of white fingers (14).
The use of other non-invasive diagnostic tests, such as Doppler recording of arm and digital blood flow and pressure, may be useful to detect arterial obstructions in subjects with severe finger blanching symptoms.

3.4.2 *Neurological investigations*

The neurological assessment of the hand-arm vibration syndrome includes several psychophysical and neurophysiological tests. The experts of the Stockholm Workshop 94 (17) recommend the use of vibration perception thresholds (single or multi frequency) and aesthesiometry (gap detection) for testing the function of various skin mechanoreceptors and their connected A-β myelinated fibres. Thermal perception thresholds are useful to investigate the function of unmyelinated C-fibres (hot thermoreceptors) and A-δ fibres (cold thermoreceptors).

The measurement of sensory and motor nerve conduction velocities in the upper and lower limbs is recommended for the diagnosis of peripheral nerve entrapments (e.g. median and ulnar nerves at the wrist and elbow) and generalised polyneuropathies. Electromyography and F-response should be also considered if proximal disorders are suspected (e.g. cervical disorders, rhizopathy).

The Purdue pegboard (assembly of pins, collars, and washers) is considered a useful testing method to measure gross movements of fingers, hands and arms and to evaluate fingertip dexterity.

Recommendations concerning standardised procedures for the cold provocation test, sensory testing and neurophysiological measurements in the diagnosis and assessment of the hand-arm vibration syndrome are included in other reports.

3.4.3 *Muscle strength investigations*

The quantitative evaluation of muscle force in the hand can be performed by means of a dynamometer to measure grip strength and a pinch gauge to measure tip, key and palmar pinch strength. Standardised testing procedures and normative data for adult males and females are available in the scientific literature (19).

3.4.4 *Radiological investigations*

X-ray films of the shoulders, elbows, wrists and hands for a radiological diagnosis of bone and joint disorders are usually required in those countries in which vibration-induced osteoartropathy in the upper limbs is recognised as an occupational disease. Sometime, radiological examination of the cervical spine and ribs may be useful to exclude the presence of thoracic outlet syndrome or costoclavicular syndrome.

3.4.5 *Laboratory tests*

Haematologic assessment [total and differential blood cell counts, sedimentation rate, blood viscosity, glucose, uric acid, rheumatoid factor, autoimmune serology (anti-nuclear antibodies, anti-DNA antibodies, anti-nucleolar antibodies, anti-centromere antibodies, ENA antibodies, anti-cardiolipin antibodies), cryoglobulins, serum protein electrophoresis, immunoglobulins] and urinalysis for proteinuria and glycosuria are recommended when history or clinical findings indicate need for differential diagnosis with other vascular or neurological disorders such as some of those indicated in Appendix II.

3.5 Medical removal

Avoidance or reduction of vibration exposure for workers affected with disorders of the hand-arm vibration syndrome should be decided after considering the severity of symptoms, the characteristics of the entire working process, and other aspects related to the company's medical policy and the legislation of the country. Some Institutions recommend that exposure to hand-transmitted vibration should be avoided for workers who reach either stage 2 vascular or stage 2 neurological on the Stockholm Workshop scales (see Section 6 in Appendix Ia, Section 7 in Appendix Ib, Section 3 in Appendix Ic, and Section 4 in Appendix Ic). Since there is clinical and epidemiologic evidence that some vibration-induced disorders, mainly the vascular component of the hand-arm vibration syndrome, may be reversible when vibration exposure is ceased, the physician may discuss with the employee the possibility of his/her re-employment in working practices with vibrating tools if previous symptoms and signs have improved sufficiently that they no longer meet the criteria for stage 1 vascular or neurological on the Stockholm scales (9, 10).

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Appendix Ia

Hand-transmitted vibration

Health Surveillance–Initial Assessment

Self-Administered

Questionnaire

Section 1 - Personal identification

°°

Surname ____________________________________ Name ______________________________

Address____

____ Post code |__|__|__|__|__|

Telephone number_____________________________

°°

Serial number |__|__|__|__| Date |___|___|_____|

Gender: M |_| F |_| Date of birth |___|___|_____| Age |__|__|

Ethnic group: European |_| African |_| Caribbean |_|

Asian |_| Other ____________________________________

Height: |____| cm Weight: |____| kg

Dominant hand: Left |_| Right |_|

Marital status: Single |_| Married |_|

Widow |_| Divorced |_|

Other |_|

How many school years have you completed ? ≤ 6 yr |_| 7-12 yr |_| >12 yr |_|

Section 2 - Occupational history

2.1 *Present occupation (if any)*:

Company _____ Work area _____

Job title _____

Description of work _____

_____

Date started present job |___|___|_____|

Does your current job involve the use of powered tools that vibrate your hands? No |_| Yes |_|

If no, go to question 2.2

If yes, which tools are you using?

Tools used	Hours per day	Days per week	Weeks per year	No. of years
1_____	_____	_____	_____	_____
2_____	_____	_____	_____	_____
3_____	_____	_____	_____	_____
4_____	_____	_____	_____	_____
5_____	_____	_____	_____	_____
6_____	_____	_____	_____	_____
7_____	_____	_____	_____	_____
8_____	_____	_____	_____	_____

2.2 *Past occupations with exposure to hand-transmitted vibration*

Job title	Company name	Tools used	Hours per day	Days per week	Weeks per year	Calendar year
_____	_____	_____	_____	_____	_____	19__ 19__
_____	_____	_____	_____	_____	_____	19__ 19__
_____	_____	_____	_____	_____	_____	19__ 19__
_____	_____	_____	_____	_____	_____	19__ 19__
_____	_____	_____	_____	_____	_____	19__ 19__
_____	_____	_____	_____	_____	_____	19__ 19__
_____	_____	_____	_____	_____	_____	19__ 19__

Description of work with past exposure to hand-transmitted vibration _____

_____

_____

_____

First significant exposure to hand-transmitted vibration started in 19___ at age _____

What are your hobbies? _____ _____ _____

In your spare time (i.e. outside work) have you ever regularly used a tool or machine that made your hands vibrated for more than one hour per week? No |_| Yes |_|

Tool names	Hours per week	Weeks per year	No. of years
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

2.3 *Does **an average working day** in your current job involve any of the following conditions?*

Is prolonged or recurrent work done with the back:

(a) bent forwards, backwards or sideways? Never |_|, Seldom |_|, Often|_|, Very often |_|

(b) twisted? Never |_|, Seldom |_|, Often|_|, Very often |_|

(c) bent and twisted simultaneously? Never |_|, Seldom |_|, Often|_|, Very often |_|

Is the neck repeatedly or for long periods:

(a) bent forwards, backwards or sideways? Never |_|, Seldom |_|, Often|_|, Very often |_|

(b) twisted? Never |_|, Seldom |_|, Often|_|, Very often |_|

(c) bent and twisted simultaneously? Never |_|, Seldom |_|, Often|_|, Very often |_|

Is prolonged or recurrent work performed with the arms stretched forwards, or outwards unsupported or above shoulder height? Never |_|, Seldom |_|, Often|_|, Very often |_|

Is work repeatedly done with the forearms and hands with:

(a) twisting movements? Never |_|, Seldom |_|, Often|_|, Very often |_|

(b) forceful movements? Never |_|, Seldom |_|, Often|_|, Very often |_|

(c) uncomfortable hand positions/grips? Never |_|, Seldom |_|, Often|_|, Very often |_|

(d) heavy demands on precision? Never |_|, Seldom |_|, Often|_|, Very often |_|

If manual lifting is involved:

(a) how often does lifting occur? Never |_|, Seldom |_|, Often|_|, Very often |_|

(b) lifting weights of 10 kg or more by hand? Never |_|, Seldom |_|, Often|_|, Very often |_|

(c) lifting weights of 25 kg or more by hand? Never |_|, Seldom |_|, Often|_|, Very often |_|

(d) handling beyond knee level? Never |_|, Seldom |_|, Often|_|, Very often |_|

(e) handling above shoulder height? Never |_|, Seldom |_|, Often|_|, Very often |_|

(f) ease or difficulty of grasping the load? Never |_|, Seldom |_|, Often|_|, Very often |_|

Is there repeated, prolonged or uncomfortable carrying, pushing or pulling of loads? Never |_|, Seldom |_|, Often|_|, Very often |_|

Is prolonged or recurrent work done with repeated similar working movements? Never |_|, Seldom |_|, Often|_|, Very often |_|

2.4 *Have you ever been exposed to **chemical agents** at the workplace*? No |_| Yes |_|

If yes, what chemical agents have you been exposed to at work?

Chemical	*Industry*	*Job title*	*Years of exposure*
Solvents (n-hexane, ketones, carbon disulphide)	_____	_____	19__ 19__
	_____	_____	19__ 19__
Metals (lead, arsenic, thallium, mercury)	_____	_____	19__ 19__
	_____	_____	19__ 19__
Pesticides (carbammates, organophosphates)	_____	_____	19__ 19__
	_____	_____	19__ 19__
Nitrates (explosives industry)	_____	_____	19__ 19__
Acrylamide (flocculators/grouting agents)	_____	_____	19__ 19__
Vinyl chloride (manufacture of PVC)	_____	_____	19__ 19__

Section 3 - Social history

3.1 *Nicotine consumption*

Do you smoke or have you ever smoked ? No |_| Yes |_|

If yes, when did you start smoke regularly ? 19 __

Do you still smoke ? No |_| Yes |_|

If no, when did you give up to smoke ? 19 __

If yes, how much did/do you smoke ? Cigarettes per day: |___|

Cigars per day: |___|

Pipe/rolling tobacco g per day:|___|

Do you snuff or chew tobacco regularly? No |_| Yes |_|

If yes, how many times per day ? |___|

3.2 *Alcohol consumption*

Do you drink alcohol (wine, beer, etc.) ? No |_| Yes |_|

How much do you drink daily? 0-1 unit |_| 2-3 units |_| more than 3 units |_|

How much do you drink weekly? 1-3 units |_| 4-6 units |_| more than 6 units |_|

Note: 1 unit = ½pint of beer, glass of wine, or single spirit

Section 4 – Medical history

Have you ever had any serious disease of:

4.1 *Heart or blood vessels* No |_| Yes |_|

If yes, specify _____

4.2 *Nerves* No |_| Yes |_|

If yes, specify _____

4.3 *Bones and joints* No |_| Yes |_|

If yes, specify _____

4.4 *Connective tissue* No |_| Yes |_|

If yes, specify _____

4.5 *Other (e.g. diabetes, thyroid disease)* No |_| Yes |_|

If yes, specify _____

4.6 *Injury*

Have you ever injured your hands |_|, arms |_|, shoulders |_|, neck |_|, back |_| ?

If yes, specify (soft tissue lesions, fractures, etc.) _____

4.7 *Surgical treatment*

Have you ever received surgery in your hands |_|, arms |_|, shoulders |_|, neck |_|, back |_| ?

If yes, specify _____

4.8 *Medical treatment*

Are you on any long-term medication for any condition? No |_| Yes |_|

If yes, details _____

Section 5 - Symptoms

5.1 *Whiteness*:

Have you ever experienced any colour changes in your fingers? No |_| Yes |_|

If no, go to section 5.2

If yes, what colours ? blue |_| white |_| red |_|

If you have experienced white finger, was the whiteness clearly demarcated ? No |_| Yes |_|

If yes, when did you first notice this ? 19__

When did the last episode of white finger occur?

|__|__| day(s) ago |__|__| month(s) ago |__|__| year(s) ago

Do any members of your family suffer from white finger ? No |_| Yes |_|
(only the blood relatives)

If yes, do they work with vibrating tools? No |_| Yes |_|

If you suffer from white finger, how often does it occur ?

Several times a year |_| Several times a month |_|

Several times a week |_| Several times a day |_|

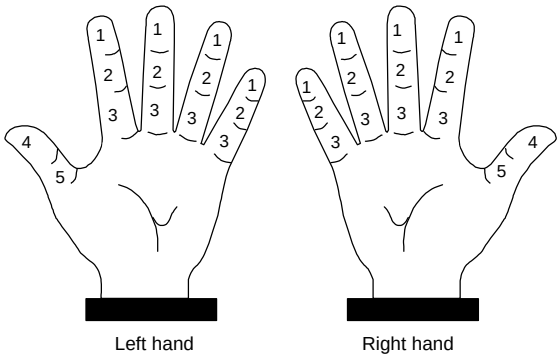
Does it occur in winter, summer or both ? Winter |_| Summer |_| Both |_|

Does any factor trigger it ?: Cold condition |_| Handling cold object |_|
When feeling the vibration from vibrating tools |_|
Others _____

Are your toes also affected ? No |_| Yes |_|

Have you noticed changes in the skin of your fingertips? No |_| Yes |_|

Which fingers/thumbs are affected with whiteness?
(indicate by shading the parts that go white on the diagram)



Score Left |____| Score Right |____| Total |____|

Does the condition interfere with any leisure activities? No |_| Yes |_|

Does the condition interfere with any work activities? No |_| Yes |_|

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

5.2 *Tingling:*

Have you ever experienced tingling in the fingers ? No |_| Yes |_|

If yes, when did you first notice this ? 19__

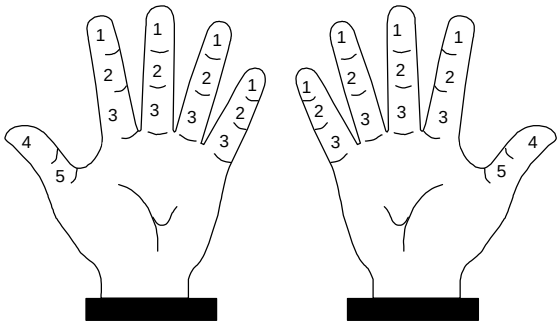
If yes, when ?

While working with vibrating tools |_| After working with vibrating tools |_|

After exposure to cold |_| During white finger |_| After white finger |_|

At night |_| At other time _____

Which fingers/thumbs are affected with tingling?
(indicate by shading the parts that get tingling on the diagram)



Score Left |____| Score Right |____| Total |____|

Does the condition interfere with any leisure activities? No |_| Yes |_|

Does the condition interfere with any work activities? No |_| Yes |_|

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

5.3 *Numbness:*

Do your fingers go numb ? No |_| Yes |_|

If yes, when did you first notice this? 19__

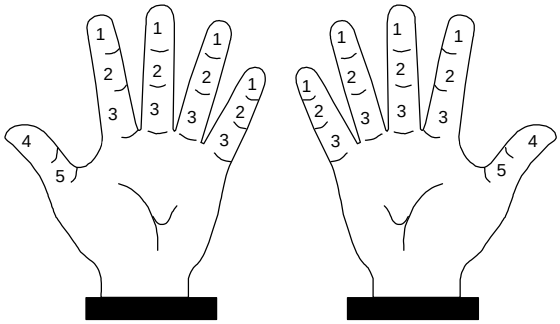
If yes, when ?

While working with vibrating tools |_| After working with vibrating tools |_|

After exposure to cold |_| During white finger |_| After white finger |_|

At night |_| At other time _____

Which fingers/thumbs are affected with numbness?
(indicate by shading the parts that get numbness on the diagram)



Score Left |____| Score Right |____| Total |____|

Does the condition interfere with any leisure activities? No |_| Yes |_|

Does the condition interfere with any work activities? No |_| Yes |_|

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

5.4 *Musculoskeletal complaints:*

Did/do you suffer from muscle/joint troubles in the upper limbs? No |_| Yes |_|

If yes, when: in the LAST 7 DAYS? |_|, in the LAST 12 MONTHS? |_|, or in the PAST? |_|

Did/do you suffer from muscle/joint troubles in the neck? No |_| Yes |_|

If yes, when: in the LAST 7 DAYS? |_|, in the LAST 12 MONTHS? |_|, or in the PAST? |_|

Which symptoms did/do you complain in the neck and/or the upper limbs?

	Pain	**Stiffness**	**Weakness**	**Swelling**	**Numbness**	**Limited movements**
Neck						
Shoulder						
Elbow						
Wrist						
Hand						

(specify the left (L) or the right (R) side of the musculoskeletal symptoms)

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

Do the above-mentioned symptoms in the fingers, hands and/or arms (whiteness, tingling, numbess, or pain) cause any difficulty with the following activities? :

	No difficulty	Difficult but not impossible	Impossible
Turn a door knob or lever	|_|	|_|	|_|
Open a tight jar lid	|_|	|_|	|_|
Put on a jacket or pullover	|_|	|_|	|_|
Fasten buttons	|_|	|_|	|_|
Handling and picking up coins	|_|	|_|	|_|
Pour from a jug or a pot	|_|	|_|	|_|

Did/do the above-mentioned symptoms affect your work ability? No |_| Yes |_|

If yes, when: in the LAST 7 DAYS? |_|, in the LAST 12 MONTHS? |_|, or in the PAST? |_|

Section 6 - Diagnostic staging*

A. Classification of the vascular symptoms according to the Stockholm scale: |___|

Stage	Symptoms
0	no attacks
1	occasional attacks that affect only the tips of one or more fingers
2	occasional attacks that affect the distal and middle (rarely also proximal) phalanges of one or more fingers
3	frequent attacks affecting all phalanges of most fingers
4	as in stage 3, with trophic skin changes in the finger tips

B. Classification of the sensorineural symptoms according to the Stockholm scale: |___|

Stage	Symptoms
0SN	exposed to vibration but no symptoms
1SN	intermittent numbness, with or without tingling
2SN	intermittent or persistent numbness, reduced sensory perception
3SN	intermittent or persistent numbness, reduced tactile discrimination and/or manipulative dexterity

***Note**: vascular and neurological staging is applicable when hand symptoms are believed to be caused by exposure to hand-transmitted vibration

Appendix Ib

Hand-transmitted vibration

Health Surveillance–Initial Assessment

Questionnaire

and

Clinical Assessment

Section 1 - Personal identification

°°°

Surname ________________________________ Name ___________________________

Address____

____ Post code |__|__|__|__|__|

Telephone number__________________________

°°°

Serial number |__|__|__|__| Date |___|___|_____|

Gender: M |_| F |_| Date of birth |___|___|_____| Age |__|__|

Ethnic group: European |_| African |_| Caribbean |_|

Asian |_| Other ________________________________

Height: |____| cm Weight: |____| kg

Dominant hand: Left |_| Right |_|

Marital status: Single |_| Married |_|

Widow |_| Divorced |_|

Other |_|

How many school years have you completed ? ≤ 6 yr |_| 7-12 yr |_| >12 yr |_|

Section 2 - Occupational history

2.1 *Present occupation (if any)*:

Company _____ Work area _____

Job title _____

Description of work _____

_____

Date started present job |___|___|_____|

Does your current job involve the use of powered tools that vibrate your hands? No |_| Yes |_|

If no, go to question 2.2

If yes, which tools are you using?

Tools used	Hours per day	Days per week	Weeks per year	No. of years
1_____	_____	_____	_____	_____
2_____	_____	_____	_____	_____
3_____	_____	_____	_____	_____
4_____	_____	_____	_____	_____
5_____	_____	_____	_____	_____
6_____	_____	_____	_____	_____
7_____	_____	_____	_____	_____
8_____	_____	_____	_____	_____

2.2 *Past occupations with exposure to hand-transmitted vibration*

Job title	Company name	Tools used	Hours per day	Days per week	Weeks per year	Calendar year
_____	_____	_____	_____	_____	_____	19__ 19__
_____	_____	_____	_____	_____	_____	19__ 19__
_____	_____	_____	_____	_____	_____	19__ 19__
_____	_____	_____	_____	_____	_____	19__ 19__
_____	_____	_____	_____	_____	_____	19__ 19__
_____	_____	_____	_____	_____	_____	19__ 19__
_____	_____	_____	_____	_____	_____	19__ 19__

Description of work with past exposure to hand-transmitted vibration _____

_____

_____

_____

First significant exposure to hand-transmitted vibration started in 19___ at age _____

What are your hobbies? _____ _____ _____

In your spare time (i.e. outside work) have you ever regularly used a tool or machine that made your hands vibrated for more than one hour per week? No |_| Yes |_|

Tool names	Hours per week	Weeks per year	No. of years
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

2.3 *Does **an average working day** in your current job involve any of the following conditions?*

Is prolonged or recurrent work done with the back:

(a) bent forwards, backwards or sideways? Never |_|, Seldom |_|, Often|_|, Very often|_|

(b) twisted? Never |_|, Seldom |_|, Often|_|, Very often|_|

(c) bent and twisted simultaneously? Never |_|, Seldom |_|, Often|_|, Very often|_|

Is the neck repeatedly or for long periods:

(a) bent forwards, backwards or sideways? Never |_|, Seldom |_|, Often|_|, Very often|_|

(b) twisted? Never |_|, Seldom |_|, Often|_|, Very often|_|

(c) bent and twisted simultaneously? Never |_|, Seldom |_|, Often|_|, Very often|_|

Is prolonged or recurrent work performed with the arms stretched forwards, or outwards unsupported or above shoulder height? Never |_|, Seldom |_|, Often|_|, Very often|_|

Is work repeatedly done with the forearms and hands with:

(a) twisting movements? Never |_|, Seldom |_|, Often|_|, Very often|_|

(b) forceful movements? Never |_|, Seldom |_|, Often|_|, Very often|_|

(c) uncomfortable hand positions/grips? Never |_|, Seldom |_|, Often|_|, Very often|_|

(d) heavy demands on precision? Never |_|, Seldom |_|, Often|_|, Very often|_|

If manual lifting is involved:

(a) how often does lifting occur? Never |_|, Seldom |_|, Often|_|, Very often|_|

(b) lifting weights of 10 kg or more by hand? Never |_|, Seldom |_|, Often|_|, Very often|_|

(c) lifting weights of 25 kg or more by hand? Never |_|, Seldom |_|, Often|_|, Very often|_|

(d) handling beyond knee level? Never |_|, Seldom |_|, Often|_|, Very often|_|

(e) handling above shoulder height? Never |_|, Seldom |_|, Often|_|, Very often|_|

(f) ease or difficulty of grasping the load Never |_|, Seldom |_|, Often|_|, Very often|_|

Is there repeated, prolonged or uncomfortable carrying, pushing or pulling of loads? Never |_|, Seldom |_|, Often|_|, Very often|_|

Is prolonged or recurrent work done with repeated similar working movements? Never |_|, Seldom |_|, Often|_|, Very often|_|

2.4 *Have you ever been exposed to* ***chemical agents*** *at the workplace*? No |_| Yes |_|

If yes, what chemical agents have you been exposed to at work?

Chemical	*Industry*	*Job title*	*Years of exposure*
Solvents (n-hexane, ketones, carbon disulphide)	_____	_____	19__ 19__
	_____	_____	19__ 19__
Metals (lead, arsenic, thallium, mercury)	_____	_____	19__ 19__
	_____	_____	19__ 19__
Pesticides (TOCP, carbammates, organophosph.)	_____	_____	19__ 19__
	_____	_____	19__ 19__
Nitrates (explosives industry)	_____	_____	19__ 19__
Acrylamide (flocculators/grouting agents)	_____	_____	19__ 19__
Vinyl chloride (manufacture of PVC)	_____	_____	19__ 19__

Section 3 - Social history

3.1 *Nicotine consumption*

Do you smoke or have you ever smoked ? No |_| Yes |_|

If yes, when did you start smoke regularly ? 19 __

Do you still smoke ? No |_| Yes |_|

If no, when did you give up to smoke ? 19 __

If yes, how much did/do you smoke ? Cigarettes per day: |___|

Cigars per day: |___|

Pipe/rolling tobacco g per day:|___|

Do you snuff or chew tobacco regularly? No |_| Yes |_|

If yes, how many times per day ? |___|

3.2 *Alcohol consumption*

Do you drink alcohol (wine, beer, etc.) ? No |_| Yes |_|

How much do you drink daily? 0-1 unit |_| 2-3 units |_| more than 3 units |_|

How much do you drink weekly? 1-3 units |_| 4-6 units |_| more than 6 units |_|

Note: 1 unit = ½pint of beer, glass of wine, or single spirit

Section 4 – Medical history

Have you ever suffered from any of the following disease ?

4.1 *Heart & Circulation*:

Angina/ischemic heart disease	No |_|	Yes |_|	Treatment |_|
High blood pressure	No |_|	Yes |_|	Treatment |_|
Cold injury (frostbite, chilblains)	No |_|	Yes |_|	Treatment |_|
Intermittent claudication	No |_|	Yes |_|	Treatment |_|
Migraine	No |_|	Yes |_|	Treatment |_|

Others _____

_____

If yes, what treatment do you receive at the present ? _____

_____

Are there any lasting effects? No |_| Yes |_|

If yes, what? _____

4.2 Neurological diseases:

Stroke	No |_|	Yes |_|	Treatment |_|
Polio	No |_|	Yes |_|	Treatment |_|
Multiple sclerosis	No |_|	Yes |_|	Treatment |_|
Syringomyelia	No |_|	Yes |_|	Treatment |_|
Polyneuropathy	No |_|	Yes |_|	Treatment |_|

Others_____

_____

If yes, what treatment do you receive at the present ? _____

_____

Are there any lasting effects? No |_| Yes |_|

If yes, what? _____

4.3 *Connective tissue diseases*:

Scleroderma	No	|_|	Yes	|_|	Treatment	|_|
Systemic Lupus Erythematosus	No	|_|	Yes	|_|	Treatment	|_|
Polyarteritis nodosa	No	|_|	Yes	|_|	Treatment	|_|
Rheumatoid arthritis	No	|_|	Yes	|_|	Treatment	|_|
Dermatomyositis	No	|_|	Yes	|_|	Treatment	|_|

Others _____

_____

If yes, what treatment do you receive at the present ? _____

_____

Are there any lasting effects? No |_| Yes |_|

If yes, what? _____

4.4 *Endocrine diseases:*

Diabetes	No	|_|	Yes	|_|	Treatment	|_|
Thyroid disfunction	No	|_|	Yes	|_|	Treatment	|_|

Others _____

_____

If yes, what treatment do you receive at the present ? _____

_____

Are there any lasting effects? No |_| Yes |_|

If yes, what? _____

4.5 *Chronic/Degenerative diseases:*

Gout	No |_|	Yes |_|	Treatment |_|
Psoriasis	No |_|	Yes |_|	Treatment |_|
Arthritis of the hands	No |_|	Yes |_|	Treatment |_|
Arthritis of the elbows	No |_|	Yes |_|	Treatment |_|
Arthritis of the shoulders	No |_|	Yes |_|	Treatment |_|
Arthritis or disc lesion of the neck	No |_|	Yes |_|	Treatment |_|
Trigger finger	No |_|	Yes |_|	Treatment |_|
Dupuytren's contracture	No |_|	Yes |_|	Treatment |_|
Carpal ganglia	No |_|	Yes |_|	Treatment |_|
Carpal tunnel syndrome	No |_|	Yes |_|	Treatment |_|
Median nerve entrapment at the elbow	No |_|	Yes |_|	Treatment |_|
Ulnar nerve entrapment at the wrist	No |_|	Yes |_|	Treatment |_|
Ulnar nerve entrapment at the elbow	No |_|	Yes |_|	Treatment |_|
De Quervain's tendinitis	No |_|	Yes |_|	Treatment |_|
Epicondylitis	No |_|	Yes |_|	Treatment |_|
Frozen shoulder	No |_|	Yes |_|	Treatment |_|
Other soft tissue and joint disorders in the hand	No |_|	Yes |_|	Treatment |_|
Other soft tissue and joint disorders in the arm	No |_|	Yes |_|	Treatment |_|
Other soft tissue and joint disorders in the shoulder	No |_|	Yes |_|	Treatment |_|

If yes, what treatment do you receive at the present ? _____

_____

Are there any lasting effects? No |_| Yes |_|

If yes, what? _____

4.6 *Injury*

Have you ever injured your hands |_|, arms |_|, shoulders |_|, neck |_|, back |_| ?

If yes, specify (soft tissue lesions, fractures, etc.) _____

_____

4.7 *Surgical treatment*

Have you ever received surgery in your hands |_|, arms |_|, shoulders |_|, neck |_|,back |_| ?

If yes, specify _____

4.8 *Medical treatment:*

Have you ever been treated with any drug for a long time? No |_| Yes |_|

If yes, details _____

_____

Have you ever been treated with the following drugs ?:

Cardiovascular diseases: β-blockers, clonidine, nitroglycerin	No |_| Yes|_|
Migraine: ergot, methysergide	No |_| Yes|_|
Cancer: vinblastine, bleomycin, cisplatin	No |_| Yes|_|
Tuberculosis: isoniazid, ethambutol, streptomycin	No |_| Yes|_|
Epilepsy: phenytoin	No |_| Yes|_|
Inflammatory or chronic diseases: indomethacin, gold, cyclosporin	No |_| Yes|_|
Infectious diseases: chloramphenicol, nitrofurantoin, polymyxin, metronidazole	No |_| Yes|_|
Diseases of the nervous system: imipramine, amphetamines	No |_| Yes|_|

Section 5 - Symptoms

5.1 *Whiteness*:

Have you ever experienced any colour changes in your fingers? No |_| Yes |_|

If no, go to section 5.2

If yes, what colours ? blue |_| white |_| red |_|

If you have experienced white finger, was the whiteness clearly demarcated ? No |_| Yes |_|

If yes, when did you first notice this ? 19__

Latent interval _____ years

When did the last episode of white finger occur?

|__|__| day(s) ago |__|__| month(s) ago |__|__| year(s) ago

Do any members of your family suffer from white finger ? No |_| Yes |_|
(only the blood relatives)

If yes, do they work with vibrating tools? No |_| Yes |_|

If you suffer from white finger, how often does it occur ?

Several times a year |_| Several times a month |_|

Several times a week |_| Several times a day |_|

Does it occur in winter, summer or both ? Winter |_| Summer |_| Both |_|

How many attacks did you have last winter? (mark on the table below)

0	1-10	11-30	31-100	> 100

How many attacks did you have last summer? (mark on the table below)

0	1-5	6-10	11-20	> 20

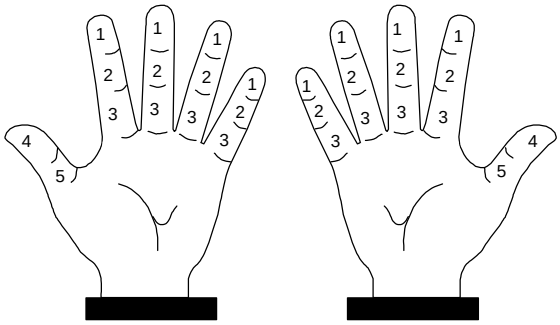
What is the longest period your fingers have appeared white? |____| minutes

Does any factor trigger it ?: Cold condition |_| Handling cold object |_|
When feeling the vibration from vibrating tools |_|
Others _____

Are your toes also affected ? No |_| Yes |_|

Have you noticed changes in the skin of your fingertips? No |_| Yes |_|

Which fingers/thumbs are affected with whiteness?
(indicate by shading the parts that go white on the diagram)



Score Left |____| Score Right |____| Total |____|

Present state (whitness): Stationary |_|, Improving |_|, Deteriorating |_|

Does the condition interfere with any leisure activities? No |_| Yes |_|

Does the condition interfere with any work activities? No |_| Yes |_|

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

5.2 *Tingling:*

Have you ever experienced tingling in the fingers ? No |_| Yes |_|

If yes, when did you first notice this ? 19__

Latent interval _____ years

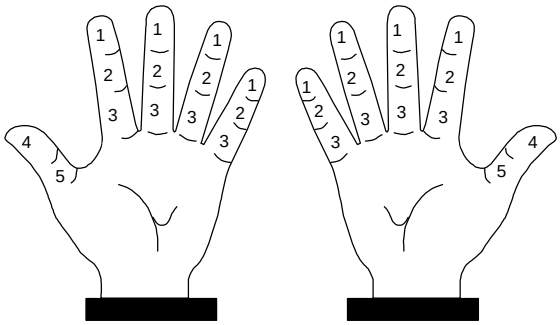
If yes, when ?

While working with vibrating tools |_| After working with vibrating tools |_|

After exposure to cold |_| During white finger |_| After white finger |_|

At night |_| At other time _____

Which fingers/thumbs are affected with tingling?
(indicate by shading the parts that get tingling on the diagram)



Score Left |____| Score Right |____| Total |____|

Present state (tingling): Stationary |_|, Improving |_|, Deteriorating |_|

Does the condition interfere with any leisure activities? No |_| Yes |_|

Does the condition interfere with any work activities? No |_| Yes |_|

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

5.3 *Numbness:*

Do your fingers go numb ? No |_| Yes |_|

If yes, when did you first notice this? 19__

Latent interval _____ years

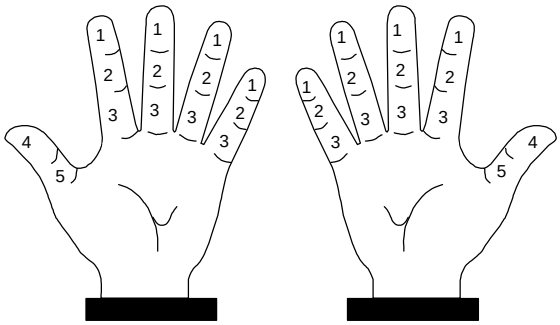
If yes, when ?

While working with vibrating tools |_| After working with vibrating tools |_|

After exposure to cold |_| During white finger |_| After white finger |_|

At night |_| At other time _____

Which fingers/thumbs are affected with numbness?
(indicate by shading the parts that get numbness on the diagram)



Score Left |____| Score Right |____| Total |____|

Present state (numbness): Stationary |_|, Improving |_|, Deteriorating |_|

Does the condition interfere with any leisure activities? No |_| Yes |_|

Does the condition interfere with any work activities? No |_| Yes |_|

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

5.4 *Musculoskeletal complaints:*

Did/do you suffer from muscle/joint troubles in the upper limbs? No |_| Yes |_|

If yes, when: in the LAST 7 DAYS? |_|, in the LAST 12 MONTHS? |_|, or in the PAST? |_|

Did/do you suffer from muscle/joint troubles in the neck? No |_| Yes |_|

If yes, when: in the LAST 7 DAYS? |_|, in the LAST 12 MONTHS? |_|, or in the PAST? |_|

Which symptoms did/do you complain in the neck and/or the upper limbs?

	Pain	**Stiffness**	**Weakness**	**Swelling**	**Numbness**	**Limited movements**
Neck						
Shoulder						
Elbow						
Wrist						
Hand						

(specify the left (L) or the right (R) side of the musculoskeletal symptoms)

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

Do the above-mentioned symptoms in the fingers, hands and/or arms (whiteness, tingling, numbess, or pain) cause any difficulty with the following activities? :

	No difficulty	Difficult but not impossible	Impossible
Turn a door knob or lever	|_|	|_|	|_|
Open a tight jar lid	|_|	|_|	|_|
Put on a jacket or pullover	|_|	|_|	|_|
Fasten buttons	|_|	|_|	|_|
Handling and picking up coins	|_|	|_|	|_|
Pour from a jug or a pot	|_|	|_|	|_|

Did/do the above-mentioned symptoms affect your work ability? No |_| Yes |_|
If yes, when: in the LAST 7 DAYS? |_|, in the LAST 12 MONTHS? |_|, or in the PAST? |_|

During the LAST 12 MONTHS have you had low back troubles? No |_| Yes |_|
(ache, pain, or discomfort)

If yes, did the pain spread down your legs to below the knee? No |_| Yes |_|

Did it make difficult or impossible to put on socks, stocking or tights?

No difficulty |_|, Difficult but not impossible |_|, Impossible |_|

What is the total length of time that you have had low back troubles during the LAST 12 MONTHS ? :

0 days |_|, 1-7 days |_|, 8-30 days |_|, more than 30 days but not every day |_|, every day |_|

What is the total length of time that low back troubles has prevented you from doing your normal work (at home or away from home) during the LAST 12 MONTHS? :

0 days |_|, 1-7 days |_|, 8-30 days |_|, more than 30 days |_|

Have you had low back troubles at any time during the LAST 7 DAYS? No |_| Yes |_|

How often do you suffer from the following health problems? :

Headaches	Never |_|	Occasionally |_|	Frequently |_|
Feeling constantly tired	Never |_|	Occasionally |_|	Frequently |_|
Feeling low in mood or spirits	Never |_|	Occasionally |_|	Frequently |_|
Feeling tired or under stress	Never |_|	Occasionally |_|	Frequently |_|

Section 6 - Physical examination

6.1 *Appearance of hands and arms* (describe)

Deformities:_____

Scars: _____

Callosities: _____

Muscle wasting: _____

Trophism: _____

Dupuytren's contracture: _____

Any abnormality of the upper limbs: _____

_____

6.2 *Vascular assessment:*

Pulse:	**Left**			**Right**		
	Good	**Poor**	**Absent**	**Good**	**Poor**	**Absent**
Brachial						
Radial						
Ulnar						
Post. Tibial						

Adson's test: **Left : +ve/-ve** **Right: +ve/-ve**

Blood pressure: **Left arm:_____(mmHg)** **Right arm:_____(mmHg)**

Pulse rate:_____ per minute

Hand circulation:	**Left**	**Right**
Cyanosis	Present/Absent	Present/Absent
Finger temperature	Cool/Warm	Cool/Warm
Lewis-Prusik test	Normal/Abnormal	Normal/Abnormal
Allen's test: Radial	+ve/-ve	+ve/-ve
Allen's test: Ulnar	+ve/-ve	+ve/-ve

6.3 *Neurological assessment:*

Test	**Left hand**		**Right hand**	
	Normal	/ Abnormal	Normal	/ Abnormal
Manual dexterity (e.g. picking up small coins)				
Pain sensation (pin prick)				
Light touch (cotton wool)				
Temperature (cool & hot appreciation)				
Vibrotactile perception (tuning fork)				

Grip strenght (Newtons) **Left |___|** **Right |___|**

Carpal tunnel Syndrome	**Left**	**Right**
Tinel's test	+ve/-ve	+ve/-ve
Phalen's test	+ve/-ve	+ve/-ve

Tendon reflexes	**Left**			**Right**		
	Hypor.	**Normal**	**Hyper.**	**Hypor.**	**Normal**	**Hyper.**
Radial						
Bicipital						
Tricipital						
Quadricipital						
Achilles						

Section 7 - Diagnostic staging*

A. Classification of the vascular symptoms according to the Stockholm scale: |___|

Stage	Symptoms
0	no attacks
1	occasional attacks that affect only the tips of one or more fingers
2	occasional attacks that affect the distal and middle (rarely also proximal) phalanges of one or more fingers
3	frequent attacks affecting all phalanges of most fingers
4	as in stage 3, with trophic skin changes in the finger tips

B. Classification of the sensorineural symptoms according to the Stockholm scale: |___|

Stage	Symptoms
0SN	exposed to vibration but no symptoms
1SN	intermittent numbness, with or without tingling
2SN	intermittent or persistent numbness, reduced sensory perception
3SN	intermittent or persistent numbness, reduced tactile discrimination and/or manipulative dexterity

***Note**: vascular and neurological staging is applicable when hand symptoms are believed to be caused by exposure to hand-transmitted vibration

Appendix Ic

Hand-transmitted vibration

Health Surveillance-Follow up Assessment

Self-Administered

Questionnaire

°°

Surname ________________________________ Name ____________________________

°°

Serial number |__|__|__|__| Date |___|___|_____|

Gender: M |_| F |_| Date of birth |___|___|_____| Age |__|__|

Height: |____| cm Weight: |____| kg

Date of last examination |___|___|_____|

Section 1

1.1 Has there been any change in address? No |_| Yes |_|

If yes, specify: ____

____

Telephone number ___________________________

1.2 Has there been any change in job activities? No |_| Yes |_|

If yes, new job title ____

Describe new work activities ____

____

Date changed job |___|___|_____|

Does your current job involve the use of powered tools that vibrate your hands? No |_| Yes |_|

If no, go to question 1.3

If yes, which tools are you using?

Tools used	Hours per day	Days per week	Weeks per year	No. of years
1_____	_____	_____	_____	_____
2_____	_____	_____	_____	_____
3_____	_____	_____	_____	_____
4_____	_____	_____	_____	_____
5_____	_____	_____	_____	_____
6_____	_____	_____	_____	_____
7_____	_____	_____	_____	_____
8_____	_____	_____	_____	_____

1.3 Has there been any change in your hobbies? No |_| Yes |_|

If yes, specify _____

_____

In your spare time (i.e. outside work) have you ever regularly used a tool or machine that made your hands vibrated for more than one hour per week? No |_| Yes |_|

Tool names	Hours per week	Weeks per year	No. of years
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

1.4 Has there been any change in smoking habit? No |_| Yes |_|

If yes, specify _____

_____

1.5 Has there been any change in drinking habit? No |_| Yes |_|

If yes, specify _____

_____

1.6 Has there been any change in medication? No |_| Yes |_|

If yes, specify _____

_____

1.7 Has there been any illness since the last examination? No |_| Yes |_|

If yes, specify _____

_____

1.8 Has there been any injury since the last examination? No |_| Yes |_|

If yes, specify _____

_____

1.9 Have you been seen by a doctor because of any illness or injury? No |_| Yes |_|

Have you been hospitalised because of any illness or injury? No |_| Yes |_|

How many days did you have off work during the past 12 months?

0 day |_|,1 week |_|,2 weeks |_|,3 weeks |_|,1 month |_|,2 months |_|,3 months|_|, >3 months|_|

Section 2 - Symptoms

2.1 *Whiteness*:

Have you ever experienced any colour changes in your fingers? No |_| Yes |_|

If no, go to section 2.2

If yes, what colours ? blue |_| white |_| red |_|

If you have experienced white finger, was the whiteness clearly demarcated ? No |_| Yes |_|

If yes, when did you first notice this ? 19__

When did the last episode of white finger occur?

|__|__| day(s) ago |__|__| month(s) ago |__|__| year(s) ago

Do any members of your family suffer from white finger ? No |_| Yes |_|
(only the blood relatives)

If yes, do they work with vibrating tools? No |_| Yes |_|

If you suffer from white finger, how often does it occur ?

Several times a year |_| Several times a month |_|

Several times a week |_| Several times a day |_|

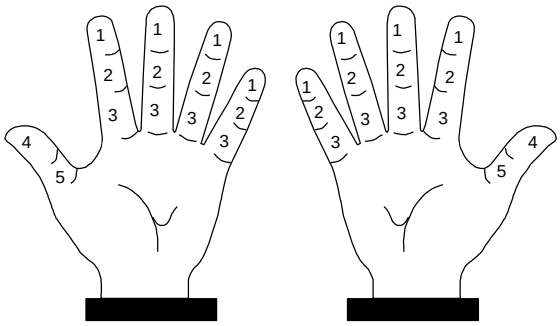
Does it occur in winter, summer or both ? Winter |_| Summer |_| Both |_|

Does any factor trigger it ?: Cold condition |_| Handling cold object |_|
When feeling the vibration from vibrating tools |_|
Others _____

Are your toes also affected ? No |_| Yes |_|

Have you noticed changes in the skin of your fingertips? No |_| Yes |_|

Which fingers/thumbs are affected with whiteness?
(indicate by shading the parts that go white on the diagram)



Score Left |____| Score Right |____| Total |____|

Does the condition interfere with any leisure activities? No |_| Yes |_|

Does the condition interfere with any work activities? No |_| Yes |_|

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

2.2 *Tingling:*

Have you ever experienced tingling in the fingers ? No |_| Yes |_|

If yes, when did you first notice this ? 19__

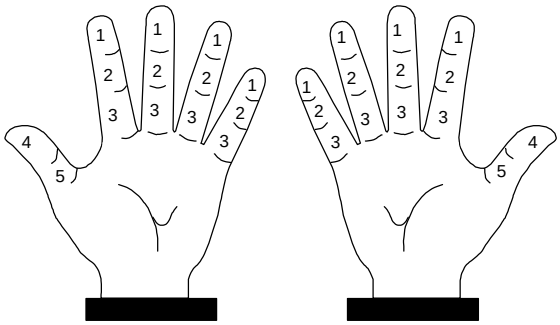
If yes, when ?

While working with vibrating tools |_| After working with vibrating tools |_|

After exposure to cold |_| During white finger |_| After white finger |_|

At night |_| At other time _____

Which fingers/thumbs are affected with tingling?
(indicate by shading the parts that get tingling on the diagram)



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Does the condition interfere with any leisure activities? No |_| Yes |_|

Does the condition interfere with any work activities? No |_| Yes |_|

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

2.3 *Numbness:*

Do your fingers go numb ? No |_| Yes |_|

If yes, when did you first notice this? 19__

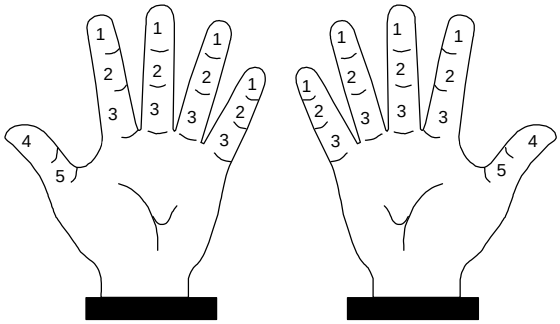
If yes, when ?

While working with vibrating tools |_| After working with vibrating tools |_|

After exposure to cold |_| During white finger |_| After white finger |_|

At night |_| At other time _____

Which fingers/thumbs are affected with numbness?
(indicate by shading the parts that get numbness on the diagram)



Score Left |____| Score Right |____| Total |____|

Does the condition interfere with any leisure activities? No |_| Yes |_|

Does the condition interfere with any work activities? No |_| Yes |_|

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

2.4 *Musculoskeletal complaints:*

Did/do you suffer from muscle/joint troubles in the upper limbs? No |_| Yes |_|

If yes, when: in the LAST 7 DAYS? |_|, in the LAST 12 MONTHS? |_|, or in the PAST? |_|

Did/do you suffer from muscle/joint troubles in the neck? No |_| Yes |_|

If yes, when: in the LAST 7 DAYS? |_|, in the LAST 12 MONTHS? |_|, or in the PAST? |_|

Which symptoms did/do you complain in the neck and/or the upper limbs?

	Pain	**Stiffness**	**Weakness**	**Swelling**	**Numbness**	**Limited movements**
Neck						
Shoulder						
Elbow						
Wrist						
Hand						

(specify the left (L) or the right (R) side of the musculoskeletal symptoms)

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

Do the above-mentioned symptoms in the fingers, hands and/or arms (whiteness, tingling, numbess, or pain) cause any difficulty with the following activities? :

	No difficulty	Difficult but not impossible	Impossible
Turn a door knob or lever	|_|	|_|	|_|
Open a tight jar lid	|_|	|_|	|_|
Put on a jacket or pullover	|_|	|_|	|_|
Fasten buttons	|_|	|_|	|_|
Handling and picking up coins	|_|	|_|	|_|
Pour from a jug or a pot	|_|	|_|	|_|

Did/do the above-mentioned symptoms affect your work ability? No |_| Yes |_|

If yes, when: in the LAST 7 DAYS? |_|, in the LAST 12 MONTHS? |_|, or in the PAST? |_|

Section 3 - Diagnostic staging*

A. Classification of the vascular symptoms according to the Stockholm scale: |___|

Stage	Symptoms
0	no attacks
1	occasional attacks that affect only the tips of one or more fingers
2	occasional attacks that affect the distal and middle (rarely also proximal) phalanges of one or more fingers
3	frequent attacks affecting all phalanges of most fingers
4	as in stage 3, with trophic skin changes in the finger tips

B. Classification of the sensorineural symptoms according to the Stockholm scale: |___|

Stage	Symptoms
0SN	exposed to vibration but no symptoms
1SN	intermittent numbness, with or without tingling
2SN	intermittent or persistent numbness, reduced sensory perception
3SN	intermittent or persistent numbness, reduced tactile discrimination and/or manipulative dexterity

***Note**: vascular and neurological staging is applicable when hand symptoms are believed to be caused by exposure to hand-transmitted vibration

Appendix Id

Hand-transmitted vibration

Health Surveillance-Follow up Assessment

Questionnaire

and

Clinical Assessment

°°

Surname ________________________________ Name ____________________________

°°

Serial number |__|__|__|__|__| Date |___|___|_____|

Gender: M |_| F |_| Date of birth |___|___|_____| Age |__|__|

Height: |____| cm Weight: |____| kg

Date of last examination |___|___|_____|

Section 1

1.1 Has there been any change in address? No |_| Yes |_|

If yes, specify: ____

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Telephone number ___________________________

1.2 Has there been any change in job activities? No |_| Yes |_|

If yes, new job title ____

Describe new work activities ____

____

Date changed job |___|___|_____|

Does your current job involve the use of powered tools that vibrate your hands? No |_| Yes |_|

If no, go to question 1.3

If yes, which tools are you using?

Tools used	Hours per day	Days per week	Weeks per year	No. of years
1_____	_____	_____	_____	_____
2_____	_____	_____	_____	_____
3_____	_____	_____	_____	_____
4_____	_____	_____	_____	_____
5_____	_____	_____	_____	_____
6_____	_____	_____	_____	_____
7_____	_____	_____	_____	_____
8_____	_____	_____	_____	_____

1.3 Has there been any change in your hobbies? No |_| Yes |_|

If yes, specify _____

_____

In your spare time (i.e. outside work) have you ever regularly used a tool or machine that made your hands vibrated for more than one hour per week? No |_| Yes |_|

Tool names	Hours per week	Weeks per year	No. of years
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

1.4 Has there been any change in smoking habit? No |_| Yes |_|

If yes, specify _____

_____

1.5 Has there been any change in drinking habit? No |_| Yes |_|

If yes, specify _____

_____

1.6 Has there been any change in medication? No |_| Yes |_|

If yes, specify _____

_____

1.7 Has there been any illness since the last examination? No |_| Yes |_|

If yes, specify _____

_____

1.8 Has there been any injury since the last examination? No |_| Yes |_|

If yes, specify _____

_____

1.9 Have you been seen by a doctor because of any illness or injury? No |_| Yes |_|

Have you been hospitalised because of any illness or injury? No |_| Yes |_|

How many days did you have off work during the past 12 months?

0 day |_|,1 week |_|,2 weeks |_|,3 weeks |_|,1 month |_|,2 months |_|,3 months|_|, >3 months|_|

Section 2 - Symptoms

2.1 *Whiteness*:

Have you ever experienced any colour changes in your fingers? No |_| Yes |_|

If no, go to section 2.2

If yes, what colours ? blue |_| white |_| red |_|

If you have experienced white finger, was the whiteness clearly demarcated ? No |_| Yes |_|

If yes, when did you first notice this ? 19__

Latent interval _____ years

When did the last episode of white finger occur?

|__|__| day(s) ago |__|__| month(s) ago |__|__| year(s) ago

Do any members of your family suffer from white finger ? No |_| Yes |_|
(only the blood relatives)

If yes, do they work with vibrating tools? No |_| Yes |_|

If you suffer from white finger, how often does it occur ?

Several times a year |_| Several times a month |_|

Several times a week |_| Several times a day |_|

Does it occur in winter, summer or both ? Winter |_| Summer |_| Both |_|

How many attacks did you have last winter? (mark on the table below)

0	1-10	11-30	31-100	> 100

How many attacks did you have last summer? (mark on the table below)

0	1-5	6-10	11-20	> 20

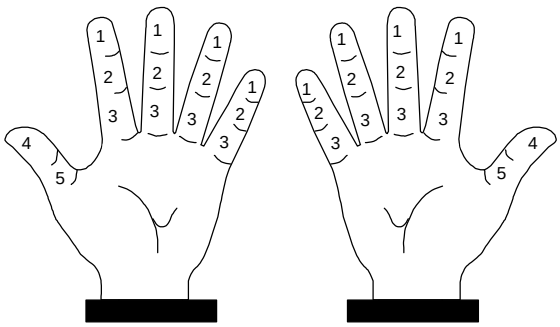
What is the longest period your fingers have appeared white? |____| minutes

Does any factor trigger it ?: Cold condition |_| Handling cold object |_|
When feeling the vibration from vibrating tools |_|
Others _____

Are your toes also affected ? No |_| Yes |_|

Have you noticed changes in the skin of your fingertips? No |_| Yes |_|

Which fingers/thumbs are affected with whiteness?
(indicate by shading the parts that go white on the diagram)



Score Left |____| Score Right |____| Total |____|

Present state (whitness): Stationary |_|, Improving |_|, Deteriorating |_|

Does the cond. nterfere with any leisure ac. s? No |_| Yes |_|

Does the condition interfere with any work activities? No |_| Yes |_|

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

2.2 *Tingling:*

Have you ever experienced tingling in the fingers ? No |_| Yes |_|

If yes, when did you first notice this ? 19__

Latent interval _____ years

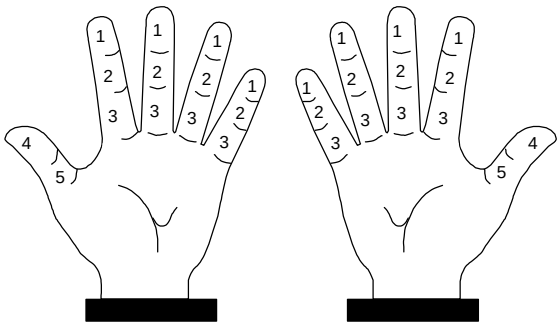
If yes, when ?

While working with vibrating tools |_| After working with vibrating tools |_|

After exposure to cold |_| During white finger |_| After white finger |_|

At night |_| At other time _____

Which fingers/thumbs are affected with tingling?
(indicate by shading the parts that get tingling on the diagram)



Score Left |____| Score Right |____| Total |____|

Present state (tingling): Stationary |_|, Improving |_|, Deteriorating |_|

Does the condition interfere with any leisure activities? No |_| Yes |_|

Does the condition interfere with any work activities? No |_| Yes |_|

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

2.3 *Numbness:*

Do your fingers go numb ? No |_| Yes |_|

If yes, when did you first notice this? 19__

Latent interval _____ years

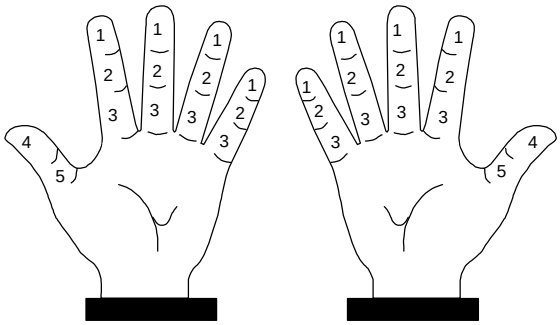
If yes, when ?

While working with vibrating tools |_| After working with vibrating tools |_|

After exposure to cold |_| During white finger |_| After white finger |_|

At night |_| At other time _____

Which fingers/thumbs are affected with numbness?
(indicate by shading the parts that get numbness on the diagram)



Score Left |____| Score Right |____| Total |____|

Present state (numbness): Stationary |_|, Improving |_|, Deteriorating |_|

Does the condition interfere with any leisure activities? No |_| Yes |_|

Does the condition interfere with any work activities? No |_| Yes |_|

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

2.4 *Musculoskeletal complaints:*

Did/do you suffer from muscle/joint troubles in the upper limbs? No |_| Yes |_|

If yes, when: in the LAST 7 DAYS? |_|, in the LAST 12 MONTHS? |_|, or in the PAST? |_|

Did/do you suffer from muscle/joint troubles in the neck? No |_| Yes |_|

If yes, when: in the LAST 7 DAYS? |_|, in the LAST 12 MONTHS? |_|, or in the PAST? |_|

Which symptoms did/do you complain in the neck and/or the upper limbs?

	Pain	**Stiffness**	**Weakness**	**Swelling**	**Numbness**	**Limited movements**
Neck						
Shoulder						
Elbow						
Wrist						
Hand						

(specify the left (L) or the right (R) side of the musculoskeletal symptoms)

If there has been no exposure to hand-trasmitted vibration in the past 18 months:

Have symptoms deteriorated more than 18 months after the last exposure ? No |_| Yes |_|

Do the above-mentioned symptoms in the fingers, hands and/or arms (whiteness, tingling, numbess, or pain) cause any difficulty with the following activities? :

	No difficulty	Difficult but not impossible	Impossible
Turn a door knob or lever	|_|	|_|	|_|
Open a tight jar lid	|_|	|_|	|_|
Put on a jacket or pullover	|_|	|_|	|_|
Fasten buttons	|_|	|_|	|_|
Handling and picking up coins	|_|	|_|	|_|
Pour from a jug or a pot	|_|	|_|	|_|

Did/do the above-mentioned symptoms affect your work ability? No |_| Yes |_|
If yes, when: in the LAST 7 DAYS? |_|, in the LAST 12 MONTHS? |_|, or in the PAST? |_|

During the LAST 12 MONTHS have you had low back troubles? No |_| Yes |_|
(ache, pain, or discomfort)

If yes, did the pain spread down your legs to below the knee? No |_| Yes |_|

Did it make difficult or impossible to put on socks, stocking or tights?

No difficulty |_|, Difficult but not impossible |_|, Impossible |_|

What is the total length of time that you have had low back troubles during the LAST 12 MONTHS ? :

0 days |_|, 1-7 days |_|, 8-30 days |_|, more than 30 days but not every day |_|, every day |_|

What is the total length of time that low back troubles has prevented you from doing your normal work (at home or away from home) during the LAST 12 MONTHS? :

0 days |_|, 1-7 days |_|, 8-30 days |_|, more than 30 days |_|

Have you had low back troubles at any time during the LAST 7 DAYS? No |_| Yes |_|

How often do you suffer from the following health problems? :

Headaches	Never |_|	Occasionally |_|	Frequently |_|
Feeling constantly tired	Never |_|	Occasionally |_|	Frequently |_|
Feeling low in mood or spirits	Never |_|	Occasionally |_|	Frequently |_|
Feeling tired or under stress	Never |_|	Occasionally |_|	Frequently |_|

Section 3 - Physical examination

3.1 *Appearance of hands and arms* (describe)

Deformities:_____

Scars: _____

Callosities: _____

Muscle wasting: _____

Trophism: _____

Dupuytren's contracture: _____

Any abnormality of the upper limbs: _____

_____

3.2 *Vascular assessment:*

Pulse:	**Left**			**Right**		
	Good	**Poor**	**Absent**	**Good**	**Poor**	**Absent**
Brachial						
Radial						
Ulnar						
Post. Tibial						

Adson's test: **Left : +ve/-ve** **Right: +ve/-ve**

Blood pressure: **Left arm:_____(mmHg)** **Right arm:_____(mmHg)**

Pulse rate:_____ per minute

Hand circulation:	**Left**	**Right**
Cyanosis	Present/Absent	Present/Absent
Finger temperature	Cool/Warm	Cool/Warm
Lewis-Prusik test	Normal/Abnormal	Normal/Abnormal
Allen's test: Radial	+ve/-ve	+ve/-ve
Allen's test: Ulnar	+ve/-ve	+ve/-ve

3.3 *Neurological assessment:*

Test	**Left hand**		**Right hand**	
	Normal	/ Abnormal	Normal	/ Abnormal
Manual dexterity (e.g. picking up small coins)				
Pain sensation (pin prick)				
Light touch (cotton wool)				
Temperature (cool & hot appreciation)				
Vibrotactile perception (tuning fork)				

Grip strenght (Newtons) **Left |___|** **Right |___|**

Carpal tunnel Syndrome	**Left**	**Right**
Tinel's test	+ve/-ve	+ve/-ve
Phalen's test	+ve/-ve	+ve/-ve

Tendon reflexes	**Left**			**Right**		
	Hypor.	**Normal**	**Hyper.**	**Hypor.**	**Normal**	**Hyper.**
Radial						
Bicipital						
Tricipital						
Quadricipital						
Achilles						

Section 4 - Diagnostic staging*

A. Classification of the vascular symptoms according to the Stockholm scale: |___|

Stage	Symptoms
0	no attacks
1	occasional attacks that affect only the tips of one or more fingers
2	occasional attacks that affect the distal and middle (rarely also proximal) phalanges of one or more fingers
3	frequent attacks affecting all phalanges of most fingers
4	as in stage 3, with trophic skin changes in the finger tips

B. Classification of the sensorineural symptoms according to the Stockholm scale: |___|

Stage	Symptoms
0SN	exposed to vibration but no symptoms
1SN	intermittent numbness, with or without tingling
2SN	intermittent or persistent numbness, reduced sensory perception
3SN	intermittent or persistent numbness, reduced tactile discrimination and/or manipulative dexterity

***Note**: vascular and neurological staging is applicable when hand symptoms are believed to be caused by exposure to hand-transmitted vibration

Appendix II

LIST OF MEDICAL CONDITIONS THAT MAY INCREASE THE RISK OF UPPER LIMB DISORDERS IN WORKERS EXPOSED TO HAND-TRANSMITTED VIBRATION

At the pre-placement and periodic health examinations of workers exposed to hand-transmitted vibration from powered tools or processes, the occupational health physician shall record the case history to investigate symptoms and signs of disorders of the hand-arm vibration syndrome (HAVS). Since all symptoms and signs associated with the HAVS may be found in several other disorders or diseases, the physician shall consider all pathological conditions which can either increase the susceptibility of the individual to the adverse health effects of hand-transmitted vibration or worsen vibration-induced injuries to the vascular, neurological, and musculoskeletal systems.

The following medical conditions may increase the risk of upper limb disorders in workers exposed to hand-transmitted vibration:

Vascular

1. **Primary Raynaud's phenomenon**

2. **Secondary Raynaud's phenomenon caused by**:

    2.1 *Connective tissue disease*
    - Scleroderma
    - Systemic lupus erythematosus
    - Mixed connective tissue disease
    - Polyarteritis nodosa
    - Dermatomyositis
    - Rheumatoid arthritis
    - Sjögren's disease

2.2 *Occlusive vascular disease*
- Thromboangiitis obliterans
- Atherosclerosis
- Thrombo-embolism or aneurysm
  (e.g. hypothenar hammer syndrome)

2.3 *Compression of proximal vessels*
- Thoracic outlet syndrome (cervical rib, scalenus anterior muscle)
- Costoclavicular syndrome
- Hyperabduction syndrome

2.4 Trauma
- Following injury, fracture, or surgery
- Frost-bite
- Immersion syndrome

2.5 *Neurogenic*
- Poliomyelitis
- Syringomyelia
- Hemiplegia

2.6 *Blood abnormalities*
- Polycythaemia vera
- Cryoproteinemias
- Macroglobulinemia
- Thrombocytosis
- Leukaemia

2.7 *Occupational chemical agents*
- Vinyl chloride
- Arsenic
- Nitrates (e.g. nitroglycerin, nitroglycol)

2.8 *Drugs*
- β-Adrenoceptor blocking agents
- Clonidine
- Ergot preparations
- Nitroglycerin
- Nicotine
- Chemotherapeutic agents (e.g. vinblastine, bleomycin, cisplatin)
- Cyclosporin
- Methysergide
- Amphetamines
- Imipramine

2.9 *Miscellaneous*

- Vasculitis
- Arteriovenous fistula
- Carpal tunnel syndrome
- Fibromyalgia
- Renal disease
- Hypothyroidism
- Neoplasms
- Reflex sympathetic dystrophy
- Hepatitis B antigenemia
- Intraarterial injections

3. **Peripheral vascular disorders**

3.1 Arteriosclerosis obliterans
3.2 Thromboangiitis obliterans (Buerger's disease)
3.3 Acquired arteriovenous fistulas
3.4 Erythromelalgia

4. **Vascular disorders secondary to malformations, injuries, fractures, or surgery in the hand, arm, or neck**

Neurological

1. **Peripheral nerve entrapment**

1.1 Median nerve entrapment in the wrist (carpal tunnel syndrome)
1.2 Median nerve entrapment in the elbow (pronator syndrome)
1.3 Ulnar nerve entrapment in the wrist (Guyon's syndrome)
1.4 Ulnar nerve entrapment in the elbow (cubital tunnel syndrome)
1.5 Thoracic outlet syndrome

2. **Peripheral neuropathy**

2.1 Diabetic
2.2 Alcoholic
2.3 Cervical radiculopathy (e.g. herniated disc, narrowed intervertebral foramen)
2.4 Toxic (e.g. solvents, metals, organophosphates, carbamates)
2.5 Drugs (e.g. antibiotics, chemotherapeutic agents)

3. **Disorders of the central nervous system**

    3.1 Compressive myelopathy (e.g. spondylosis, tumors)
    3.2 Degeneration of the spinal cord
    3.3 Multiple sclerosis

4. **Neurological disorders secondary to malformations, injuries, fractures, or surgery in the hand, arm, or neck**

Musculoskeletal

1. **Severe tendinitis or tenosynovitis in the hand-wrist, elbow, shoulder** (e.g. de Quervain's tendinitis, lateral epicondylitis, shoulder tendinitis)

2. **Severe unspecific cervicobrachial disorders**

3. **Severe Dupuytren's contracture**

4. **Severe degenerative bone and joints disorders in the upper limbs and the neck** (e.g. osteoarthrosis)

5. **Severe deformities of the bone and joints of the upper limbs secondary to malformations, injuries, fractures, or surgery**

6. **Severe myopathies** (e.g. primary fibromyalgia, myofascial syndrome, tension neck syndrome, alcoholic myopathy, drug-induced myopathy, muscle pain syndrome of unknown etiology)

Appendix III

CLINICAL TESTS FOR THE DIAGNOSIS OF UPPER LIMB DISORDERS

Lewis Prusik test. This test is designed to assess capillary circulation. Pressure is applied to the nail bed for ten seconds and, on release, normal colour should return in two seconds or less. The method is poorly standardised.

Adson's test. This test is designed to detect the vascular component of the thoracic outlet syndrome. During deep inspiration, with the head rotated to the side being tested and the arm abducted, the radial artery at the wrist is palpated. In presence of subclavian obstruction, the radial pulse is reduced or absent.

Roos's test. This test is designed to detect the neurogenic component of the thoracic outlet syndrome. The subject sits erect and elevates both arms to the 90° abduction-external-rotation position with the elbows slightly braced back of the frontal plane. The subject is then asked to open and close his/her hands slowly for three minutes. Patients with thoracic outlet syndrome develop progressive distress and reproduction of their usual symptoms such as pain in the neck, shoulder and/or arms; numbness and/or tingling of the extremities; heaviness, fatigue, and weakness of the arm and/or hand.

Allen's test. This test examines the patency of the palmar arches and the digital arteries. The examiner uses the fingers of each hand to compress the radial and ulnar arteries at the wrist and then raises the subject's hand while the subject opens and closes the hand for 20 seconds to empty the palmar arches and subcutaneous vessels. The hand is then lowered and one of the arteries released. Prompt flushing of the hand indicates a normal contribution from the tested artery. Faint and delayed flushing of the fingers (more than five seconds) indicates that either the deep palmar or the digital arteries may be occluded. The test is also used for the diagnosis of the hypothenar hammer syndrome which consists of symptoms and signs of digital ischaemia caused by thrombosis and/or

aneurysm of the ulnar artery and/or the superficial palmar arch. It should be noted that normal anatomical variations may give rise to false positive results.

Tinel's sign. This test, if positive, is consistent with the presence of carpal tunnel syndrome. The subject's hand and forearm are rested horizontally on a flat, firm surface with the palm uppermost. The examiner places his/her index finger over the carpal tunnel at the wrist and applies a sharp tap to it with a tendon hammer. The complaint of pain or tingling in the subject's fingers (thumb, index, or middle finger) indicates median nerve compression at the wrist. A positive Tinel's sign over the Guyon's tunnel or the cubital tunnel suggests ulnar nerve compression at the wrist or the elbow, respectively.

Phalen's test. This test, if positive, is consistent with the presence of carpal tunnel syndrome. The subject raises his/her arms to chin level and then allows both hands to flex at the wrist by gravity. This posture should be maintained for one minute. Pain, tingling, or numbness in the median-nerve distribution of the hand is indicative of compression of the median nerve under the carpal ligament.

Finkelstein's test. This test, if positive, is consistent with the presence of De Quervain's disease (inflammation of the tendons to the long abductor and the short extensor muscle of the thumb). The subject makes a fist over the thumb, which is flexed into the palm, followed by ulnar deviation of the wrist. This maneuver increases the excursion of the first dorsal compartment tendons and leads to significant discomfort in individuals affected with De Quervain's disease.

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Appendix IV

CRITERIA FOR CLINICAL DIAGNOSES OF NECK AND UPPER LIMB MUSCULOSKELETAL DISORDERS

Disorder	Symptoms and signs
Tension neck syndrome	Neck pain, feeling of fatigue or stiffness in the neck, headache radiating from the neck, muscle tightness, palpable hardenings and tender spots in muscles, straightening of the cervical spine
Cervical syndrome	Neck pain radiating to one or both arms, numbness in the hands, limited neck movements, radiating pain provoked by test movements, diminished muscle force of the deltoid, triceps, and biceps muscles
Thoracic outlet syndrome	Pain and paraesthesia radiating to an upper limb, fatigability or weakness in the arms, numbness of an upper limb while sleeping, coolness and Raynaud-like symptoms, tenderness in the shoulder pouch (Morley's sign), bruit in infraclavicular area, positive Adson's test and/or positive Roos test, drooping shoulder
Shoulder tendinitis	Pain in the deltoid region, limited and painful resisted movements (abduction of the supraspinatus; external rotation of the infraspinatus and teres minor; internal rotation of the subscapularis)
Bicipital tendinitis	Anterior shoulder pain, pain over the long head of biceps tendon on resisted flexion of the elbow (Speed's sign) or on resisted supination of the forearm with the elbow flexed 90° (Yergason's test)
Frozen shoulder syndrome	Pain in the deltoid area (often nocturnal and related to activity), restricted and painful active and passive movements of the shoulder in a capsular pattern (external rotation > abduction > internal rotation)
Acromioclavicular syndrome	Local pain and tenderness at the acromioclavicular joint, pain at the end of abduction or in adduction of the arm over the chest

Disorder	Symptoms and signs
Epicondylitis	Pain at the epicondyle either during rest or motion, local tenderness at the lateral or medial epicondyle, pain during resisted extension of the wrist and fingers (lateral epicondylitis), pain during resisted flexion of the wrist and fingers (medial epicondylitis)
Tenosynovitis of the wrist	Pain on movement localised to the affected tendon(s) in the wrist, palpable tenderness of the tendon(s), local swelling, pain on resisted active movement of the affected tendon(s) with the forearm stabilised, weakness in gripping
De Quervain's disease	Pain over the radial styloid, tender swelling of the first extensor compartment, pain on resisted thumb extension or positive Finkelstein's test
Cubital tunnel syndrome (ulnar nerve entrapment at the elbow)	Pain, paraesthesia, or numbess in the ulnar nerve distribution of the hand, sensory loss in 4^{th} and 5^{th} fingers, positive Tinel's sign over the cubital tunnel, decreased strength in spreading the fingers and in flexion of the distal phalanx of 5^{th} finger, loss of power grip, atrophy of hypothenar and interosseus muscles
Guyon's syndrome (ulnar nerve entrapment at the wrist)	Pain, paraesthesia, or numbess in the ulnar nerve distribution of the hand, sensory loss in 4^{th} and 5^{th} fingers, positive Tinel's sign over the Guyon's tunnel, decreased strength in spreading the fingers
Pronator syndrome (median nerve entrapment at the forearm)	Pain in the proximal forearm, pain and numbess in radial side of palm and palmar side of first three and a half fingers, local tenderness over the edge of m. pronator teres, pain and decreased strength in pronation, decreased flexion strength of the wrist and/or of the distal phalanxes of 1^{st} and 2^{nd} fingers
Carpal tunnel syndrome (median nerve entrapment at the wrist)	Pain, paraesthesia, or numbess in the median nerve distribution of the hand, nocturnal exacerbation of symptoms, sensory loss in three and a half fingers on the radial side of the hand, positive Tinel's sign over the carpal tunnel, positive Phalen's test, weakness in pinching or gripping, atrophy of abductor pollicis brevis

Disorder	Symptoms and signs
Hypothenar hammer syndrome	Paraesthesias, numbness, cold sensitivity, colour changes without cold exposure in the affected hand, positive Allen's test
Dupuytren's contracture (palmar fibromatosis)	Nodules, thickening or retraction of the skin, cords, and bands on the palmar surface of the hands and fingers, and, finally, progressive and irreversible flexion of the fingers, mostly the ring finger followed by the little finger
Carpal ganglia (cysts arising from a joint or tendon sheath)	Firm mass or fullness over the dorsum of the wrist at the radiocarpal joint or at the palmar aspect of the wrist just radial to the flexor carpi radialis tendon, often asymptomatic, occasionally complaints of aching or discomfort of the wrist exacerbated by activity, rarely loss of wrist motion secondary to pain
Trigger finger (stenosing tenosynovitis of the digital flexor tendons)	Tenderness along the palmar flexor tendon sheath over the first annulary pulley in the distal palm with discomfort on repeated digital flexion, difficulty initiating extension of the fingers or thumb from a flexed position with accompanied pain, palpable nodule on the flexor tendon accentuated with active flexion and extension of the involved finger, inability to completely extend the finger ("locked" or incarcerated trigger finger)
Unspecified MS symptoms (cumulative trauma disorders, occupational cervicobrachial disorders, repetitive strain injuries, overuse syndrome)	Recurring or persistent pain, aching, numbness, stiffness or weakness across the upper limbs with concomitant headache, loss of function, muscle tenderness, slowing of fine movements, unspecified findings on clinical examination and failure to meet the diagnostic criteria for other specific diagnoses and diseases

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