Supporting occupational health and wellbeing professionals

THE IDENTIFICATION AND MANAGEMENT OF HAND ARM VIBRATION SYNDROME **(HAVS)**

Drafted by the SOM HAVS Special Interest Group

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1. INTRODUCTION

1. The following chapters have been produced by members of the Society of Occupational Medicine HAVS Special Interest Group (SIG) as a resource to assist those involved in the diagnosis and management of workers with hand arm vibration syndrome (HAVS), or at risk of developing HAVS.
2. This guide does not aim to be a comprehensive overview of HAVS, nor does it seek to replace existing guidelines or formal HAVS education. Rather, it is a set of practical summaries intended to provide background information and assist the practitioner who is asked to examine workers exposed to hand-transmitted vibration (HTV). Practitioners seeking to gain further expertise in HAVS are encouraged to undertake further education for the Faculty of Occupational Medicine's certificate in HAVS; HSE guidelines recommend that experience and qualification in occupational health and successful completion of HAVS training is required to undertake formal health surveillance of those exposed to hand transmitted vibration (HTV). A list of additional resources is included for those seeking more detailed information.
3. The individual summaries have been prepared by members of a working group set up by the Society of Occupational Medicine and are intended to represent good practice at the time of publication. However, each section does not necessarily represent the views of any individual member of the group, and the working group makes no assumption that its recommendations represent the views of all the members of the Society.
4. While the papers are presented in good faith, it is the responsibility of the reader to ensure that their approach to matters relating to HAVS and CTS accords with best current practice, and legal requirements, and the SOM will accept no responsibility resulting from the failure of any reader to ensure that they do so.
5. The Special Interest Group welcomes any comments or suggestions regarding this publication. The SOM will assist members by directing specific enquiries about HAVS or CTS to an appropriate member of the Group.
6. The Society of Occupational Medicine would like to thank the following members of the HAVS SIG who gave their time and expertise in developing these guidelines:

   Professor Jill Belch
   Dr Kathryn Campion
   Dr Robin Cordell
   Dr Dominic Haseldine
   Dr Scott Lang
   Dr Ian Lawson
   Dr Chandra Mutalik
   Mrs Astrid Palmer
   Dr Jon Poole
   Miss Nikla Rai
   Dr Minha Rajput-Ray
   Dr Euan Bell
   Dr Simon Sheard
   Dr Danny Wong
   Dr Roger Cooke
7. Occupational health practitioners assessing vibration related hand conditions play a pivotal role in the identification of HAVS and carpal tunnel syndrome (CTS) in workers exposed to HTV. They will also be involved in advising employees and employers when there is a need to reduce exposure to vibration so as to limit the progression of disease. The correct diagnosis and subsequent management of vibration related symptoms can be challenging to the health practitioner who sees occasional cases of HAVS, given the complexity of the medical and employment issues.

8. According to modern practice standards, clinical activity is expected to be reliable and based on the current best evidence. In medicine this is usually based on peer-reviewed, published scientific literature. Evidence based medicine provides a framework for clinical decision-making processes and integrates the evidence with clinical experience and individualized subject factors. However, the evidence may be limited in its relevance and applicability.
9. The aim of this document is to provide general advice on HAVS and combine a review of the best available evidence for HAVS management with current expert practice. Accordingly, the document aims to summarise the substantial amount of evidence currently available for the management of HAVS in a concise and easily readable form. It provides consensus views of the group in respect of best practice, some key evidence and include useful tips and advice to avoid common pitfalls.
10. Each section of the document has been written as a standalone paper providing a detailed approach to an aspect of HAVS which can be read independently of the other sections. Also included are some worked case examples as a guide to assist practitioners. The appendices provide supporting information and some templates. This is not a comprehensive review of HAVS, and readers are advised to refer to the additional resources section, and other relevant literature.
11. The document has been developed primarily for occupational health practitioners who are engaged with managing and supporting workers with HAVS and CTS. It may also be accessed by other health professionals or technicians who may find the content useful. The intention is not to provide prescriptive rules for individual cases but to assist with diagnosis, staging and the preparation of management reports. The views expressed do not necessarily represent the views of any particular member of the HAVS Special Interest Group but are considered best practice by members at the time of publication. Members are encouraged to seek further specialist advice where appropriate.

2. EXPOSURE TO HAND TRANSMITTED VIBRATION

Written by Dr Roger Cooke (March 2018)

2.1. Aims

- The aims of this paper are to review the relevance of exposure data to the development of HAVS, describe the principles of measurement, and its application to health surveillance, including consideration of the dose response relationship and putative "no-harm level" of exposure.

2.2 Key messages

- The occupational health professional undertaking HAVS surveillance is expected to understand a vibration risk assessment, including the relevance of exposure levels.
- Assessment of tool emission and exposure time (trigger time) is most effectively done in the workplace under working conditions.
- Use of manufacturers or suppliers' data is appropriate for tool emissions, subject to that data reflecting the intended method of use.
- Retrospective estimates of trigger time by tool operators are unlikely to be accurate.
- There is no accepted method of defining individual risk of developing HAVS, although predictions of population incidence of vascular symptoms are used.
- There is no accepted method of predicting population risk of sensorineural or musculoskeletal symptoms of HAVS.
- There is no accepted level of exposure that is regarded as "safe" for those with existing HAVS.
- A "no-harm" exposure level of 1 m/sec^2 is widely accepted as appropriate.
- Exposure at the Exposure Action Value (EAV - 2.5 m/sec^2) for 12 years is expected to produce symptoms of white finger in 10% of the workforce.
- The over-riding duty of employers, which is not dependent on exceeding the EAV, is to reduce exposure to as low as is reasonably practicable.
- Other duties arise if the EAV is exceeded – including health surveillance.

2.3 Introduction

Development of hand arm vibration syndrome is, by definition, dependent on exposure to hand transmitted vibration having a pathological effect. The relationship between exposure levels and development is not clear, but it is used to estimate population risk of the vascular component of HAVS, and therefore will constitute part

of the vibration risk assessment. Regulation 5 of Control of Vibration at Work defines the risk assessment process and states that "the employer shall assess daily exposure to vibration by means of…. reference to relevant information on the probable magnitude of the vibration corresponding to the equipment used in the particular working conditions".

The key factors to be considered when estimating daily exposure to vibration are the vibration emission levels of the various tools used during a day, and the duration of exposure, "trigger time", for use of each of those various tools. Modern vibration measurement equipment allows accurate assessment of the trigger time and level of vibration emitted by the tool. In many cases, both the vibration emissions of the tools and the trigger time are based on retrospective estimates.

Occupational health professionals undertaking health surveillance are expected to be able to understand the likely exposure of an employee. Retrospective determination of long-term exposure, using a range of tools in different jobs, is unlikely to be accurate, and hence conclusions are likely to be indicative rather than definitive.

2.4 The characteristics of vibration

In considering hand transmitted vibration the vibration that is emitted by a tool is described using three key features, being:

a. The direction of vibration being the "x", "y" and "z" axes, as in the diagram below. Initial work was based on measurement the level of vibration exposure in the single (dominant) axis, but following the adoption of ISO 5349-1: 2001, the standard method of measurement of such vibration was altered, becoming based on a sum of the vibration in all three axes (tri-axial). This is not an arithmetic sum, but is a root mean square addition. While tri-axial measurement is believed to be a more accurate representation of the total amount of vibration transmitted to the hands, it meant that the figures used to calculate vibration magnitude in this way are not directly comparable with figures derived from dominant axis calculations. It is generally accepted that multiplying the single axis figure by 1.4 gives a broad estimate of the tri-axial measurement.

b. The frequency, measured in cycles per second or Hertz (Hz), is important, with different frequencies being recognised as having greater or lesser health effect. A weighting is given to the frequencies of vibration considered to be most harmful, but this is allowed for in the measurement of vibration and is not generally otherwise quoted.

c. The acceleration is believed to represent the energy level associated with such vibration, and therefore its potential for causing damage. It is generally measured as metres / second/ second or m/sec^2, but lLevels of vibration exposure may also be expressed using a numerical scale propounded by the HSE, in which exposure is expressed as "points". This method has the advantage that points may be added arithmetically. Equivalent measurements as m/sec^2 and points are as in the following table.

Figure 1 – axes of vibration

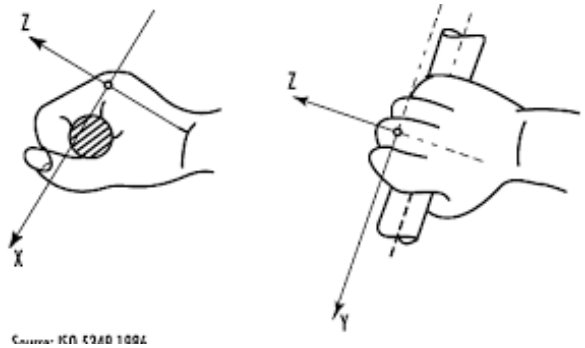


Table 1 – Acceleration levels and equivalent HSE points

Acceleration - tri-axial measurements m/sec^2	HSE points
1 m/sec^2	16
2.5 m/sec^2	100
3.5 m/sec^2	195
5 m/sec^2	400

Intermittent exposure is usually adjusted to an equivalent 8-hour exposure level, to allow for further standardisation in assessment of risk; this is known as the A(8) level. Some of the early work relating to exposure focused on 4-hour exposures, so it is important to be clear which exposure period is being used. Hence daily exposure will usually be expressed as m/sec^2 daily A(8), or points per day.

2.5. Measurement of vibration emissions from tools

Vibration is measured using an accelerometer, attached to the tool. Modern equipment will measure vibration in each of the three axes, and give a tri-axial sum, as well as measuring the duration of use, and therefore the total dose. Use of personal dosimeters takes that a stage further by allowing measurement of an individual employee's exposure when using several different tools. Because it measures all these aspects of vibration exposure for the individual employee, this is likely to be the most accurate method of estimating exposure.

While direct measurement of vibration emissions from tools is ideal, HSE guidance is that "*you may choose either to use available vibration data or to have measurements made to estimate exposures if you want to be more certain whether the risk is high, medium or low*". However it is noted that *"if you plan to use the manufacturers vibration data you should check that it represents the way you use the equipment . . . since some [manufacturers' vibration] data may underestimate workplace vibration levels substantially"* and "*if you are able to get vibration data from the manufacturer which is reasonably representative of the way you use the equipment, it should be suitable for you to use in estimating your employees exposure*". Because vibration emissions from tools will vary according to (for example) the substrate on which they are being used, it is important that any generic tool vibration levels, whether from HSE data, commercially available databases, or manufacturers or hirers, are confirmed as being appropriate to the specific circumstances under consideration.

2.6 Duration of exposure ("trigger time")

The HSE recommend that where direct measurement of trigger time is not possible, the employer should *"check by observing them how long employees are actually exposed to the vibration (since) employees are unlikely to be able to provide this information very accurately themselves"*.

Where neither direct measurement nor observation is possible, retrospective assessment of trigger time may be required. The tendency for operators to over-estimate exposure time in such circumstances has been known for many years.

HSE Contract report 232 in 1999[1] commented among their conclusions that "*workers tend to systematically overestimate the duration that they are exposed to HTV*". The authors note that *"the errors may not be large in relation to other sources of error in dose estimation. Nevertheless, tables that contain quantitative estimates of exposure must be regarded as indicative rather than definitive*". In 2000 the same group of authors published a paper which assessed self-reporting of occupational exposure to hand transmitted vibration[2], and stated that they found that workers overestimated their duration of exposure to hand transmitted vibration by a factor of 2.5 (interquartile range 1.6-5.9), with estimated duration of exposure being more accurate when the exposure was relatively continuous rather than for intermittent short periods. A small study of men using grinders was published in 2005 and concluded that estimates of exposure by the workers was about four-fold higher than estimated mean exposure by objective means[3], and in 2011, a study of dental hygienists found that *"although the exposure times were short, the self-assessed duration of exposure was overestimated on average three times higher with a diary and even more at an interview (8 times)"*[4].

1. Palmer KT, Coggon D, Bendall HE and Pannett B *Hand transmitted vibration: occupational exposures and their health effects in Great Britain* HSE Contract Research Report 232/1999
2. Palmer K, Haward B, Griffin M, Bendall H, Coggon D *Validity of self-reported occupational exposures to hand transmitted and whole-body vibration* Occup Environ Med 2000; 57: 237-241
3. Gerhardson L, Balogh I, Hambert PA et al *Vascular and nerve damage in workers exposed to vibrating tools: the importance of objective measurements of exposure time.*
4. Akesson I, Balogh I, Skerfving *Self-reported and measured time of vibration exposure at ultrasonic scaling in dental hygienists* Applied Ergonomics 2001; 32 (1) 47-51

2.7 Calculating exposure

As noted above, use of personal dosimeters allows the vibration dose to be clearly measured. Where such equipment is not used, but an estimate of exposure from a number of different tools is required, using tool emission and trigger time data, the total exposure can be calculated by adding the exposure from each individual tool together; however that is not a simple arithmetic calculation, and a much easier alternative is to use the calculator developed by HSE and available on-line.

Table 2 – HSE vibration calculator

(Source - http://www.hse.gov.uk/vibration/hav/vibrationcalc.htm)

HSE

HAND-ARM VIBRATION EXPOSURE CALCULATOR *Version 5.6 June 2019*

Company name / work area:	
Employee ID and/or task name:	

Tool or process name Select HSE recommended initial values or enter your own information	Vibration magnitude m/s²	Exposure points per hour	Time to reach EAV 2.5 m/s² *A* (8) hours	Time to reach EAV 2.5 m/s² *A* (8) minutes	Time to reach ELV 5 m/s² *A* (8) hours	Time to reach ELV 5 m/s² *A* (8) minutes	Exposure duration hours	Exposure duration minutes	Partial exposure m/s² *A* (8)	Partial exposure points

Zoom to fit | **Help**
Reset | **Print** (preview)

Reset Options:
- ☐ Lock tool or process information
- ☐ Lock company and calc. by names

Instructions for use:
Enter vibration magnitudes and exposure durations (for an individual worker or a task carried out by several workers) in the **white areas.** Results are displayed in the **yellow areas**
Information on tool types may be entered directly into the tools/process names columns, or selected from a drop-down list of HSE recommended initial data values.
To clear all cells, click on the **'Reset'** button
Tick the **'Lock tool or process information'** check box to prevent **'Reset'** clearing these cells
Additional information such as company name, worker name may be added if printing or saving the calculation.
For more information, click the **'Help'** button

Daily exposure m/s² *A* (8)	Total exposure points

Exposure calculation by:	
Job role:	
Calculation date:	

2.8 Other factors affecting individual exposure

A number of additional factors must be considered when assessing and reducing exposure to vibration. Correct use of any tool is important, with incorrect use having potential to increase the level of vibration produced by the tool or task or transmitted to the hands.

"Coupling" is the degree of contact between the tool and the hand, which will influence the amount of vibration absorbed by the hand. Appropriate training is likely to reduce the adverse effects of these issues.

Personal protective equipment is not usually a realistic option for controlling vibration exposure; although "anti-vibration gloves" are often discussed, there is little evidence that they have consistent benefit.

2.9 The "no-effect" level

In 2002, the EU Directive[5] defined a threshold level of 1m/sec^2 daily A(8) as *"the exposure value below which continuous and/ or repetitive exposure has no adverse effect on the health and safety of workers"*. Early work by Brammer had *"suggested the possibility of a no effect level of exposure in the range 1m/s^2< a_k < 2m/s^2 where a_k is the single axis, frequency weighted acceleration magnitude"* [6], which was reflected in ISO 5349-1:2001, which states that "*reports of ill-health are rare below 2m/s^2 A(8) and not known at exposures below 1m/s^2 A(8)*". A 2015 review concluded that they had *"not found any recent evidence to either substantiate or refute this implied no-effect level."* [7] The earlier evidence reviews for the Faculty of Occupational Medicine[8] had noted that *"a review of early epidemiological data suggested that there is an exposure threshold between 1-4 m/sec^2 over a working lifetime where it is unlikely to result in either sensory or vascular symptoms. This has led to the use of 1 m/sec^2 (frequency weighted) as a supposed conservative threshold for defining hand transmitted vibration exposure or tool emission below which concerns about HAVS may be unwarranted."*

In 1998, Bovenzi reported a study of point prevalence of vascular HAVS in a total of 882 users of vibrating tools concluded that the prevalence in the control group of 455 manual workers and the group exposed to less than <1m/s^2 were not significantly different [9].

In respect of individuals who have already developed symptoms of HAVS, there is no consensus as to what constitutes a "safe" level for continued exposure, which must therefore remain a matter of clinical judgement until further evidence is available.

2.10 The dose response relationship

There is insufficient evidence to define a vibration dose-response relationship for either the sensorineural component of HAVS or the various musculoskeletal symptoms that may be caused by exposure to hand transmitted vibration. Although there is general agreement that lifetime accumulation of vibration exposure contributes to the development of symptoms, and there has been considerable work looking at the basis of a dose-response relationship for the vascular component (vibration white finger), definition of the precise relationship has been elusive.

Based on Brammer's work, the level of 2.8m/sec^2 (single axis) quoted in HS(G) 88 was recognised as producing vascular symptoms in 10% of an exposed population over a period of exposure of 8 years. In comparison ISO 5349-1 refers to a level of exposure of 3.7 m/sec^2 (tri-axial) producing vascular symptoms in 10% of people in 8 years. This illustrates that a tri-axial measurement of 3.7m/sec^2 is believed to have the same health effect as a dominant axis measurement of 2.8 m/sec^2.

5. EU Directive 2002/44/EC – Physical Agents (Vibration) Directive
6. Brammer Hand-Arm Vibration 1990 pp291-299, publ. Wiley-Interscience
7. Hewitt S, Mason H A critical review of evidence related to hand arm vibration syndrome and the effects of vibration RR1060 publ HSE Books 2015
8. Mason H, Poole K Clinical Testing and management of individuals exposed to hand transmitted vibration Faculty of Occupational Medicine 2004 ISBN 1-86016-203-7
9. Bovenzi M (1998) Vibration induced vibration white finger and cold response of digital arterial vessels in occupational groups with various patterns of exposure to hand-transmitted vibration. Scand J Work Environ Health 24: 138±144

2.11 Legal issues

The Control of Vibration at Work regulations were introduced in the UK in 2005, under the umbrella of the Health and Safety at Work etc. Act 1974. Those regulations were accompanied by HSE guidance – document reference L140. Prior to that employers had a general duty under the Health and Safety at Work etc. Act, with specific guidance available through HSE document HS(G) 88 – Hand Arm Vibration, first published in 1994. In November 2010 the HSE produced a Topic Inspection Pack for HAVS, which *"provides guidance for (HSE) inspectors on the inspection of work activities involving risks from hand arm vibration (HAV) and on enforcement of the Control of Vibration at Work Regulations"*. This was superseded in 2020 by HSE document "Hand-arm vibration: Inspection and Enforcement Guidance", which is currently available on the HSE website at https://www.hse.gov.uk/foi/internalops/og/index.htm

Regulation 4(1) of the Control of Vibration at Work Regulations define a daily exposure of 5 m/s^2 A(8) (equating to 400 points on the HSE scale) as the maximum amount of vibration an employee may be exposed to on any single day (i.e. the exposure limit value – ELV) and a daily exposure of 2.5 m/s^2 A(8) (equating to 100 points on the HSE scale) as the daily exposure action value (EAV). However, the key requirement of the regulations is to reduce exposure to as low as is reasonably practicable. That is not dependent on the existing level of exposure and applies whether or not the EAV is exceeded.

Conclusions regarding exposure levels compared with the EAV exposed above or below the EAV, will determine statutory responsibilities in respect of issues such as the provision of suitable health surveillance, and the provision of suitable and sufficient information instruction and training.

It is important to note that that the EAV (2.5 m/sec^2) is not in itself a safe level of exposure, in that at that level a 10% of the workforce exposed to vibration for 12 years are likely to develop finger blanching. However, it is also important to note that at this level 90% of the exposed workforce will be expected not to develop symptoms of vascular HAVS.

2.12 Reduction of exposure to as low as reasonably practicable

The reduction of exposure to a level that is as low as reasonably practicable is not defined in terms of specifying levels of vibration, since, by definition, it requires an assessment of both the risk – and therefore of the level of vibration exposure – and of the sacrifice in money, time and trouble, involved in taking measures to avoid that risk, and a comparison of the two. The HSE[10] has identified that there is little guidance from the courts as to what reducing risks as low as is reasonably practicable means and refers the Court of Appeal judgement in *Edwards v. The National Coal Board*, which related to whether or not it was reasonably practicable to make the roof and sides of a road in a mine secure. The judgement was that "*... in every case, it is the risk that has to be weighed against the measures necessary to eliminate the risk. The greater the risk, no doubt, the less will be the weight to be given to the factor of cost,*" and that "*'reasonably practicable' is a narrower term than 'physically possible' and seems to me to imply that a computation must be made by the owner in which the quantum of risk is placed on one scale and the sacrifice involved in the measures necessary for averting the risk (whether in money, time or trouble) is placed in the other, and that, if it be shown that there is a gross disproportion between them – the risk being insignificant in relation to the sacrifice – the defendants discharge the onus on them.*"

It follows from that that the level of vibration that constitutes "as low as reasonably practicable" will vary from one industry to another, and from one organisation to another. Even within a single organisation, different circumstances may lead to different conclusions as to what is reasonably practicable in those particular circumstances. Given that the duty is to reduce exposure to a level that is low as reasonably practicable, exposure to a level greater than the EAV does not in itself constitute a breach of that duty, and conversely reduction to a level below the EAV does not in itself indicate compliance.

10. HSE website - http://www.hse.gov.uk/risk/theory/alarp1.htm#P14_1686

3. RISK ASSESSMENT FOR HAND-ARM VIBRATION SYNDROME

Written by Dr Jon Poole (September 2018)
Updated by Dr Roger Cooke (December 2020)

Advice on how to undertake a risk assessment (RA) for HAVS can be found in the HSE Guidance Hand-arm vibration: The Control of Vibration at Work Regulations 2005 (L140 – 2020), under Regulation 5, pages 11-15.

3.1 The key elements to look for in a risk assessment are:

- Is it based on observed working practices in the workplace rather than being generic in nature?
- Does it state who might be affected by exposure (jobs or names) to hand-transmitted vibration (HTV)?
- Is there information about magnitudes of vibration from the tools being used (taken from manufacturers' data, databases of typical magnitudes, or from actual workplace measurements)?
- Is there information (measured or estimated) about typical daily contact (trigger) times with each tool for the exposed workers?
- Is there a calculation of daily exposure to HTV (the HSE's on-line vibration calculator is a good way of doing this)?
- Is exposure to HTV set in the context of the daily Exposure Action Value (EAV) and the Exposure Limit Value (ELV)?
- If the EAV has been exceeded, what control measures have been instituted?
- Are there any workers with increased susceptibility to HTV? If so, how is the risk to these individuals being managed?
- Are there workers exposed to cold or wet conditions which are more likely to trigger vasospastic episodes? If there are, how is this reflected in the risk assessment (RA)?
- Does the RA indicate the need for health surveillance (HS) and if it does, have the results of previous HS been taken into account in the RA? That is, does it state whether there are cases of HAVS in the workforce?
- If there are five or more employees, then the RA should be in writing. Any worker with increased susceptibility to HTV should be considered in the RA or have their own separate RA.
- Is there a date for review and is the name of the person who did the RA stated?
- Have the workers or their representatives been involved in the RA (for example, daily contact times) and has it been shared with them?

4. HAND ARM VIBRATION SYNDROME: TIERED HEALTH SURVEILLANCE

Written by Dr Ian Lawson and Dr Jon Poole (March 2019)
Updated by Dr Roger Cooke (January 2023)

It is a requirement of the Control of Vibration at Work Regulations 2005 (CVAWR) for employers to provide health surveillance for employee who are regularly exposed at or above the Exposure Action Value of 2.5m/sec2. The guidance to these regulations (L140) recommends a multi-tiered approach to health surveillance consisting of 5 levels. The aim at each tier is to detect potential cases of HAVS as early as possible and provide suitable advice on management (see section 8).The severity of HAVS, as currently designated in HSE guidance L140, is staged by the use of a modified Stockholm Workshop Scale (SWS).

An important aim of health surveillance for HAVS is to prevent any worker reaching stage 3v or stage 3sn. Following the onset of stage 2 HAVS, the frequency of health surveillance should be increased, with the aim of detecting further progression. The frequency of such increased surveillance is a judgement by the senior OH clinician responsible for that employee.

Tier 1 Initial questionnaire prior to exposure to vibration. The completed tier 1 questionnaire should be sent in confidence to an occupational health professional, as they may contain individual medical details. Tier 3 assessment is required if there are any positive answers. Advice about working with vibration should be offered to the employer based on the tier 1 responses.

Tier 2 questionnaire should be used at least annually. Earlier assessment (at six months) is recommended for newly exposed employees to identify susceptible individuals. Any reporting of relevant symptoms should lead to tier 3 assessment.

Questionnaires for Tiers 1 and 2 can be given out by a Responsible Person, but HSE recommend that the completed tier 1 forms should be regarded as confidential and sent to an occupational health professional for assessment. The employee should be offered the alternative of the completed tier 2 form being forwarded to an occupational health professional in the same way, in order to preserve confidentiality of personal health information, and any tier 2 forms with positive answers should be forwarded to a Qualified Person for interpretation, and employment advice pending full assessment.

Tier 3 (clinical assessment) is undertaken by a registered nurse holding qualifications in occupational health and who has successfully completed a Faculty of Occupational Medicine approved course on HAVS.

It is required if there are positive responses to questions on the tier 1 or tier 2 forms. In the absence of self reported symptoms there is no need for referral to tier 3. This represents a change from the 2005 guidance L140 which recommended tier 3 assessment after negative responses for three consecutive years at Tier 2, which is therefore no longer recommended by HSE Guidance.

Where the tier 3 assessment concludes that the symptoms are compatible with or suggestive of HAVS or CTS the employee should be referred for tier 4 assessment as soon as possible. HSE guidance recommends that the employee should be assigned to alternative work with restricted or no risk from further vibration exposure pending formal (tier 4) diagnosis.

11. Poole CJM, Mason H, Harding A-H. *The relationship between clinical and standardised tests for hand-arm vibration syndrome.* Occup Med 2016; 66: 285– 291.
12. Lawson IL. *The Stockholm Workshop Scale 30 year on—is it still fit for purpose?* Occup Med 2016; 66: 595 597.
13. Poole CJM, Bovenzi M, Nilsson T, Lawson I, House R, Thompson A, Youakim S. *International consensus criteria for diagnosing and staging hand-arm vibration syndrome.* Int Arch Occup Environ Health 2019; 92: 117-127.

Tier 4 Diagnosis of HAVS or CTS by an occupational physician who has a qualification in occupational health and has successfully completed a Faculty of Occupational Medicine approved course on HAVS.

Diagnosis of HAVS or CTS will reflect the judgement of the doctor, and may trigger consideration of alternative work or restriction of vibration exposure. If employment criteria are met a diagnosis will lead to recommendation that the employer makes a RIDDOR report.

Tier 5 Quantitative sensory tests and Tier 5 referral criteria

The weaknesses of the SWS, the modified SWS and the role of quantitative sensory testing have been the subject of recent publications which may inform future guidance.[11,12,13] However, at present OPs using extant guidance may be faced with clinical uncertainty or difficult decisions on recommending ongoing vibration exposure. In these cases referral to a doctor experienced in HAVS and/ or a tier 5 HAVS centre may provide useful support.

The following referral criteria for tier 5 assessment are good practice but should not be viewed as fixed referral criteria.

i. If there is doubt about the diagnosis of HAVS.

ii. Suspected stage 2SN (early or late) or stage 3SN cases as such a staging can led to redeployment or job loss. For this reason it should be done as accurately as possible.

iii. Rapidly progressing symptoms, signs or disability associated with HAVS.

iv. Challenging cases such as those with CTS and suspected co-morbid sensorineural HAVS, or those with vascular HAVS and an abnormal Allen's test.

11. Poole CJM, Mason H, Harding A-H. *The relationship between clinical and standardised tests for hand-arm vibration syndrome.* Occup Med 2016; 66: 285– 291.

12. Lawson IL. *The Stockholm Workshop Scale 30 year on—is it still fit for purpose?* Occup Med 2016; 66: 595 597.

13. Poole CJM, Bovenzi M, Nilsson T, Lawson I, House R, Thompson A, Youakim S. *International consensus criteria for diagnosing and staging hand-arm vibration syndrome.* Int Arch Occup Environ Health 2019; 92: 117-127.

5. HAND ARM VIBRATION SYNDROME: TAKING THE HISTORY

Written by Dr Ian J Lawson (July 2018)

5.1 Introduction

A number of questionnaires have been developed to assist in the history taking and examination of possible cases of HAVS at tier 3 and 4 level health surveillance. The questionnaire in HSE Guidance L140 is the most commonly used. Whilst these include all relevant questions the format can sometimes lead to a disconnection between sections where linkage is key to making an appropriate conclusion. The purpose of this document is to provide additional guidance on these key issues and linkages in the history and examination and how these should be assimilated with the overall assessment.

The order that histories are taken can be a personal preference such as occupational history first followed sensory then vascular symptoms and the order of headings here are for convenience. A lot of useful information can be gathered by self-administered Katz diagrams of symptom patterns. These can be sent out for completion prior to the appointment (an example is shown in the appendix which can also be set out to personal preference).

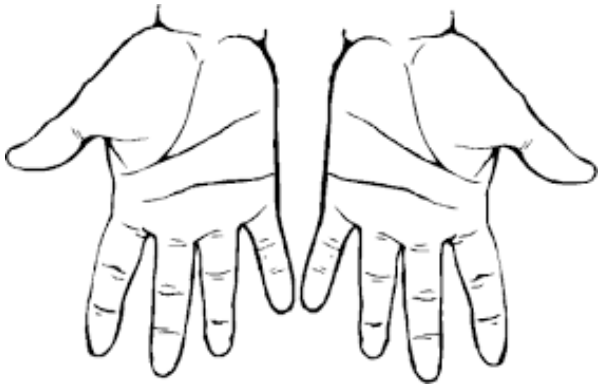
5.2 Vascular symptoms

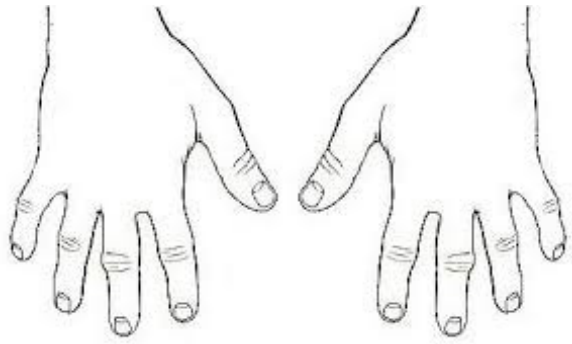
- Ascertain by open history whether episodic vasospastic whiteness is occurring (starting distally in one or more fingers, usually circumferential, demarcated whiteness and not a description involving the whole hand, blotchiness or physiological vasoconstriction).
- Photographs, usually from a phone should be requested ahead of the face-to-face appointment whenever possible. These should be identifiable as the individual's (compare with hands in situ or taken against the face). Also have a catalogue of photos showing normal/vasospastic fingers to be shown to the employee.
- Whilst circumferential whiteness is the usual description provided with Raynaud's phenomenon it can sometimes just affect one side of the digit.
- Ask whether the nails are affected. Blueness alone is sometimes described by some and is acceptable.
- What other associated symptoms are reported with vasospasm; finger numbness or tingling; redness; blueness; pain; 'hot aches' at end of attack (bi-and tri-phasic descriptions are rare in practice). How long lasting are the episodes of blanching.
- It is very important to determine date of onset as precisely as possible (not just when the worker became aware of a problem). The circumstances associated with attacks (cold or otherwise; emotion; pressure; whilst using vibrating tools is unusual unless cold exposure or cold tool surface or exhaust air). How did it commence; fingertips initially or all of fingers (initial extensive vasospasm more suggestive of Raynaud's disease or some other cause of secondary Raynaud's phenomenon).
- Note what aggravates an attack such as cold or damp working conditions. How has it progressed from the onset of symptoms and are symptoms worsening or remaining the same. With regard to attack frequency note the worst-case scenario in the cold (per week/month/year), and, if all year round, frequency both in winter and summer. Note when the last attack was (n.b. classed as inactive if none for 2 yrs). Attacks usually last between 20-30 minutes but can range from a few minutes up to 2 hours (possibly think of alternative diagnosis if >2hrs). Summertime episodes when evenings cool probably indicative of progression of the condition although there is no absolute temperature and the relative change in ambient temperature can be enough to precipitate an attack.
- Enquire if other peripheral parts of the body are affected by colour changes particularly the toes. A description of cold feet, just like cold hands, may be normal. Whiteness of toes if described does not exclude HAVS if fingers affected but think of possible primary Raynaud's phenomenon.
- How many fingers are affected in a typical attack (document worse case); number of episodes in cold weather.
- Shade in and document as opposite.

5.3 Sensory Symptoms

- Numbness (N) and tingling (T) may occur with blanching or on rewarming as described. N & T that presents out with blanching in a warm environment is more indicative of a separate sensory component of HAVS, rather than physiological numbness and tingling in response to the blanching. N&T generally start before blanching but not always and separate 'sensory only' and 'vascular only' components of HAVS occur.

Figure 2: Pictograms used for illustrating the distribution of vascular and sensory symptoms





- Again enquire about the onset and progression of each (be aware of vernacular idioms when taking a history as terms N & T may not be readily understood ('crawling', 'fat' fingers, 'buzzing', 'electric shocks').
- Documentation of fingers affected and aggravating circumstances as with vascular. Tingling that occurs after using vibrating tools is physiologically normal and generally accepted as ceasing after 20 minutes (Temporary Threshold Shift, TTS).
- Some describe symptoms that occur intermittently and others a more persistent awareness. Enquire about the effect of periods away from work has on symptoms. Again prior hand pictograms are valuable particularly in ascertaining the true distribution. A mono-neuropathy may be present (median or ulnar) but caution against textbook descriptions of nerve distribution (i.e. forearm and palmer median to ulnar nerves frequently anastomose, *Clark 2011*. Remember to relate symptoms to the type of tool usage and exposed fingers/thumbs (n.b. thumbs generally not affected in most power tool grips as separated by other fingers).
- As the neuropathy progresses there is loss of sensibility and manual dexterity loss. Other symptoms such as pain, stiffness or swelling of fingers/hands/wrists should be documented.
- Note the aggravating circumstances such as work with vibrating tools, certain forceful gripping or particular work activities. How have symptoms progressed and are they worsening or improving. Note any interference with social activities such as hobbies
- If nocturnal symptoms enquire if woken by or is merely noticed if wake for other reasons. The former is more indicative of an entrapment neuropathy. 'Fetal' sleepers and those who swap hands when using a mobile phone because of sensory symptoms is suggestive of cubital tunnel syndrome. *(Cutts 2007*). If problems with dexterity, ask for examples which should be readily forthcoming.
- Grip is often reduced in those working with vibrating tools but its association to HAVS is unclear but functional effects are important to describe particularly any workplace limitations or potential safety issues. Enquire regarding functional effects on activities of daily living.

Past Medical & Social History

A. Vascular Raynaud's disease or Primary Raynaud's phenomenon (common, symmetrical, prior to exposure, other periphery, family history, stress). N.B. 15% of carpal tunnel syndrome (CTS) cases have Secondary Raynaud's phenomenon,RP (*Hartmann 2012*). Other causes of secondary RP include connective tissue disorders Less common causes of vascular symptoms may include; acute injuries, non-freezing cold injuries (NFCI), thoracic outlet syndrome (TOS) (suspect from history of neurovascular symptoms on arm elevation), thrombo-embolism, cold haemagglutinin disease (CHD) or cryoglobulinaemia (suspect if cyanosis or blotchy whiteness in non-cold exposure or history of Hep C).

B. Sensory Entrapment neuropathy: carpal tunnel syndrome (CTS) and cubital tunnel syndrome (CBTS) are the commonest (CTS 4 to 1 CBTS). An ulnar neuropathy at the level of the wrist maybe part of a hypothenar hammer syndrome (HHS). Cervical spondylitis with radiculitis (symptoms may worsen on neck movement). Diabetic neuropathy; usually not presenting until 10 years plus from onset and being 'length-dependant' does not usually affect hands ('glove') if feet ('stocking') not present (*Watson 2015*). Other conditions to consider are peripheral vascular disease and systemic conditions such as MS or CVA.

C. Medication *Vasoactive drugs*. Non-selective beta-blockers commonest (note onset of symptoms with use of; other periphery often affected but can be confined to the hands in 50% of cases). CTS also reported at increased risk if taking non-selective beta-blockers *Drugs affecting nervous system e.g. metronidazole.*

D. Operations/ Fractures / X-rays Injuries/fractures; lacerations can leave sensory deficit but usually detected/ reported at time of injury. May have been told had cervical rib on Chest X-Ray.

E. Family History If Raynaud's phenomenon (Usually 1st degree but can skip a generation), CTD, 'Vibration White Finger', CTS, Dupuytren's(DC).

F. Dominant hand Left / Right / Ambidextrous

G. Hobbies that include HTV exposure. How symptoms affect hobbies. HTV outside work (motor bike, chainsaws etc.) unlikely to be relevant unless excessive.

H. Smoking Smoker/Ex-smoker/Non-smoker. Effects of smoking on HAVS minimal. Reported increased OR for CTS (Pourmemari 2014)

I. Alcohol Units per week. Excessive may lead to an alcoholic neuropathy.

5.4 Occupational History

There is separate guidance on HTV exposure and the purpose of this section on history taking is to focus on the linkage with other aspects of the history. There can often be an extensive occupational history of HTV so that gathering basic details prior to the appointment can be time saving (see separate proforma in the appendix).

- Time should be spent at interview gathering information on what the 'trigger' times are likely to be given that most overestimate their exposures. Is there any asymmetry of exposure; ask whether there is a perception of greater exposure on any particular hand/fingers. Relate this to symptomatic hands and fingers. Depending on the task/s either leading hand or trigger hand/fingers may be exposed to higher levels of exposure. Hygiene data on measurement levels may help as does a workplace visit. The temporary threshold shift (TTS) described after finishing a task can also assist in lateralising exposures. It is helpful to have a catalogue of commonly used tools as many workers use local idioms to describe tools they use. Explore how the exposure relates to symptoms in terms of onset, progression and improvement when away from certain tasks or on holiday.
- It is key in this section to ascertain when vibration started and if no longer used when it was reduced or ceased.
- If thumbs are symptomatic see if the grip used may be relevant i.e. tripod grip in pedestal polishing. Enquire about whether the hand/palm surface has ever been used like a hatchet to strike components or workpieces (if HHS is a possibility).
- This section should include enquiry about potential neurotoxic exposures.
- HTV measurements: if known or presumed from supplier data. Convert to points if preferred;
- Points per hour $P_{E,1h} = 2a^2_{hv}$; Consult EU Good Practice Guide HAV on commonly used tools typical ahv values. 'Average': can be estimated A(8) by HSE calculator.
- Leading hand: this is the hand/fingers closest to vibration-workpiece interface.
- Trigger: the hand/fingers closest to the source of the vibrating tool.
- Anti-vibration devices/ gloves: although anti-vibration gloves not generally able to reduce harmful vibration frequencies. May be an indication of employer support and useful if cold workplace and tools.
- Shifts/overtime/periodic work: to take account of any potential additional or intermittent exposures.
- High pressure hose/ impact activity: high pressure hoses such as sand or wet blasting have been shown to produce potential harmful levels of HTV.

Received damages at Common Law or Industrial Injury Disablement Benefit:

This question may be seen as intrusive and unnecessary in the context health surveillance, but it is still part of a confidential medical assessment. An outstanding claim or assessment for IIDB may be relevant to the overall presentation and assessment: however enquiry is for the individual OP to decide if relevant.

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6. HAVS - CLINICAL EXAMINATION

Written by Dr Ian Lawson (July 2018)

There are usually few signs to help in diagnosis of HAVS, other than excluding CTS and other differential diagnoses (annotate hands where appropriate).

1. **Temperature** of hands; note if cool after acclimatisation at room temperature (caution - normal finger skin temperature (FST) 30°C - 34°C and perception depends on observer's normal FST. Thermocouple preferable).
2. **Colour**: vasospasm unlikley but note any acrocyanosis (cryoglobulinaemia ?) or trophic changes (connective tissue disease ?).
3. **Scars**: very old injuries often fogotten in history taking so enquire re forearm, hand and digitial injuries. Latter can particularly impact on Quantitative Sensory Testing (QST).
4. **Callosities**: volar distribution usually reflected in active working hands. Note any mismatch between findings and reported disability (disappear after 3 months inactivity). Actual callosity on fingertips between tip and whorl is unusual in manual workers although some thickening of skin may be detected.
5. **Muscle wasting**: Thenar/Hypothenar/Dorsal interossei; Wasting of thenar more a dip or crescent shaped groove at outer edge of muscle bulk than a flattening (median nerve) and best seen from above with hands in 'prayer position'. First dorsal interossei most noticeable if muscle loss is present (ulnar/ cubital tunnel problem).
6. **Cervical Spine / upper limb movement** / cervical rib / joint swelling / pain/ stiffness; check normal range of movement in neck and upper limb joints and note any reproduction of symptoms. Note any swelling, deformity or stiffness (RA or osteoarthritis is a risk factor for CTS). Subluxing ulnar nerve at elbow increases risks of cubital tunnel syndrome.
7. **Dupuytren's/Trigger finger**: thickening, nodules, cords, or deformity of DC. Trigger Finger TF; tenderness or nodules over A1 pulley or overt triggering (CTS, DC and triggering often occur together and may suggest idiopathic association).
8. **Power**: general power grip of examiner's two fingers(ulnar); abductor pollicis brevis (point thumb away from horizontal palm towards ceiling and push against) and dorsal interossei (kept fingers spread apart and push against) for median and ulnar nerves respectively (n.b. add Froment's sign if interossei appear weak).
9. **Pulses / Blood Pressure**: standard Allen's (or Doppler assisted if available) / Adson's or Roos (if indicated by history
10. **Tinel's**: tapping lightly over nerve at wrist (distal volar skin crease- median nerve) and elbow (cubital tunnel –ulnar). **Phalen's**; passively flexed wrists positive if provoked within 60 seconds. Caution over reported sensitivity and specificity of these two tests.
11. Add **fixed flexion test at elbows** if suspect cubital tunnel syndrome (elbow flexion, wrist extension for one minute; positive if paraesthesia in ulnar nerve distribution).

7. METHODOLOGIES FOR CLINICAL EXAMINATION

Written by Prof J Belch

7.1 Blood Pressure

Step 1: Choose the right equipment

What you will need:

1. *A quality stethoscope*
2. *An appropriately sized blood pressure cuff*
3. *A blood pressure measurement instrument*

Step 2: Prepare the subject

Make sure the subject is relaxed by allowing 5 minutes to relax before the first reading. The subject should sit upright with their upper arm positioned so it is level with their heart and feet flat on the floor.

Remove excess clothing that might interfere with the BP cuff or constrict blood flow in the arm. Be sure you and the subject refrain from talking during the reading.

Step 3: Choose the proper BP cuff size

Most measurement errors occur by not taking the time to choose the proper cuff size. Wrap the cuff around the subject's arm and use the lines marked on the cuff to determine if the subject's arm circumference falls within the acceptable range for that cuff. If it does not, choose the appropriate smaller or larger cuff.

Step 4: Place the BP cuff on the subject's arm

Palpate/locate the brachial artery and position the BP cuff so that the ARTERY marker points to the brachial artery. Wrap the BP cuff snugly around the arm.

UNLESS AN AUTOMATED BP MACHINE IS BEING USED FOLLOW THE INSTRUCTIONS BELOW:

Step 5: Position the stethoscope

On the same arm that you placed the BP cuff, palpate the arm at the antecubital fossa (crease of the arm) to locate the strongest pulse sounds and place the bell of the stethoscope over the brachial artery at this location.

Step 6 - Inflate the BP cuff:

Begin pumping the cuff bulb as you listen to the pulse sounds. When the BP cuff has inflated enough to stop blood flow you should hear no sounds through the stethoscope. The gauge should read 30 to 40 mmHg above the person's normal BP reading. If this value is unknown, you can inflate the cuff to 160 - 180 mmHg. (If pulse sounds are heard right away, inflate to a higher pressure.)

Step 7: Slowly deflate the BP cuff, begin deflation.

The AHA recommends that the pressure should fall at 2 - 3 mmHg per second, anything faster may likely result in an inaccurate measurement. *

Step 8 - Listen for the Systolic Reading:

The first occurrence of rhythmic sounds heard as blood begins to flow through the artery is the subject's systolic pressure. This may resemble a tapping noise at first.

Step 9: Listen for the Diastolic Reading

Continue to listen as the BP cuff pressure drops and the sounds fade. Note the gauge reading when the rhythmic sounds stop (which is known as the fifth Korotkov sound). This will be the diastolic reading.

For complete accuracy a mean of three readings can be employed.

IN ALL CASES:

Step 10: Repeat Procedure in Other Arm

It is important to measure BP in both arms. Use of two sphygmomanometers may be considered to measure the two arms simultaneously.

A difference of 20 mm Hg or more between the two sides may indicate subclavian arterial obstruction.

7.2 Grip Strength

Background

This procedure is to be used for measuring handgrip strength. Grip strength has been shown in previous studies to be a predictor of current and future health.

Purpose

To ensure correct and uniform measurement of handgrip strength.

Scope

This procedure applies to any study requiring measurements of handgrip strength.

Responsibilities

It is the responsibility of the measurer to use this procedure when measuring handgrip strength. It is the responsibility of the principal investigator to ensure that staff members who are working on specific studies have adequate experience to do so.

Figure 3: hydraulic dynamometer

Step 1: Choose the right equipment

There are a number of machines available to measure Grip Strength and choosing one which makes accurate and reproducible measures is key. This document has been prepared as a Standard Operating Procedure (SOP) for using the JAMAR hydraulic hand dynamometer to measure grip strength (Figure 3).

The dynamometer has a dual scale readout which displays isometric grip force from 0-90 kg (0-200lb). The outer dial registers the result in kg and the inner dial registers the result in lb. It has a peak hold needle which automatically retains the highest reading until the device is reset. The handle easily adjusts to five grip positions from 35-87 mm (1½ - 3¼") in 13 mm (½") increments. Always use the wrist strap to prevent the dynamometer from falling on the floor if accidentally dropped.

The NIHR and some instrument manufacturers recommend that checks below are carried out on SCBR dynamometers quarterly, although if well cared for, the device should only need to be calibrated annually. A six-monthly calibration is recommended by the manufacturers if the device is subjected to vibrations on a frequent basis, e.g. carried around in a car.

If the instrument has been dropped or there is any reason to suspect that the calibration is erroneous, the instrument should be sent for servicing. Some will accept annual checks to ensure that the instruments are measuring accurately. These suggestions for the Jamar dynamometer are made by the manufacturer in the owner's manual (link)

The Jamar Hand Dynamometer calibration procedure is carried out off-site. The frequency of external calibrations will be specific to each study so make sure you are aware of when the external calibrations are due and ensure that, if required, there is another device available for use during the period of time when yours is offsite. See Appendix G for details of checking and maintaining the dynamometer.

Procedure

1. Document the serial number of the dynamometer you are using.
2. Wash your hands and explain the procedure to the participant.
3. Ensure that the dynamometer is cleaned before use. An appropriate single use wipe is sufficient unless there is reason to believe there has been gross contamination.
4. Ask the participant to remove their shoes and also any watches and/or bracelets.
5. Record the participant's hand dominance.
6. Demonstrate how to hold the dynamometer to the participant by testing it on yourself and explain how the dial registers the best result by squeezing as tightly as possible.
7. Sit them comfortably in a chair with a back support.
8. Use the same style of chair for every measurement.
9. Ask the participant to rest their forearms on the arms of the chair and keep their feet flat on the floor. You should ask the participant to roll their trousers/jeans up in order to ensure their feet are flat on the floor and do not rise from the floor when squeezing the dynamometer.
10. Their wrists should be just over the end of the chair's arm, thumb facing upwards.
11. Ask them to position their thumb round one side and their fingers around the other side of the handle. When they are holding the dynamometer in the correct position their fingers and thumb should be visible on the same side of the apparatus (figure 3).
12. Check with them that the instrument feels comfortable in their hand. The position of the handle can be adjusted if necessary, for different sized hands. You will notice whether the handle needs altering based on the distance of the four fingers from the palm of the hand. If the fingernails are digging into the palm, it will be uncomfortable for the participant and means that the handle needs moving further away from the mechanism. If it looks as though the fingers are not close enough to the palm and it feels to the participant as though their hand may slip off the handle when squeezing, it suggests that the handle needs to be adjusted to bring it closer to the mechanism.
13. Inform them that it will feel as if there was no resistance.
14. Ensure the red needle is in the "0" position by turning the dial.
15. Start with the right hand and then repeat the measurement with the left hand.
16. The measurer should support the weight of the dynamometer by resting it on their palm while the subject holds the dynamometer, but they should not be restricting the movement of the device.
17. Encourage squeezing as long and as tightly as possible for the best result until the needle stops rising. Use a standard squeezing phrase "Squeeze……harder, harder…and stop squeezing"
18. When the needle stops rising read the measurement (in kg) from the dial and record the result to the nearest 1kg. The outside dial registers the result in kg and the inner dial in lb.
19. Disregard and repeat the test if the participant's arm rises above the arm of the chair, or if their feet lift off the floor during the measurement.
20. Record three measurements for each hand, alternating sides.
21. Thank the participant.

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7.3 Purdue Peg Board Test

Administration

Before administering the Purdue Pegboard Test, the test administrator is advised to carefully read this section of the manual. As with any standardised test, it is important to follow the directions very closely. The test must be administered to all applicants according to the standardised test procedure. If the test is not given identically, irrelevant factors may affect test scores. In order to reduce the variability among test administrator's, specific details regarding the arrangement of materials and the testing procedures are presented below.

Practice the administration of the Purdue Pegboard before conducting a test on a subject. The amount of practice needed in order to become comfortable with the testing process is dependent upon the test administrator's previous testing experience. The test administrator should practice the Purdue Pegboard until he or she is able to perform each of the tests at an average speed for demonstration purposes. Note: The test administrator will be demonstrating to the test subject what is expected of him or her before each test.

Test Batteries and Timing

The test administrator will compile 5 separate scores from the complete test procedure, one for each test battery:

1. Right Hand (30 seconds)
2. Left Hand (30 seconds)
3. Both Hands (30 seconds)
4. Right + Left + Both Hands

   Note: The test is not an actual test; it is a mathematical sum calculation.
5. Assembly (60 seconds)

The test batteries should be done in this consecutive order, unless the subject is left-handed, where test batteries 1 and 2 are reversed: Left Hand first and then Right Hand. Three test trials are highly recommended: the more trials administered, the more test score reliability.

Note: The test is well suited for either group or individual testing.

Equipment Required

The following equipment and supplies are required to ensure that the Lafayette Instrument Purdue Pegboard Test is consistent, standardised test:

1. Purdue Pegboard Test (Model #32020)
   a. Instruction manual
   b. 1 Test Board
   c. Pins, Collars, Washers
   d. Score Sheets

Figure 4: Purdue Peg Board

2. At least one testing table approximately 30 inches tall.

   Note: The subject must be seated throughout the administration of the test.

3. Stopwatch or clock that reads in seconds.

General Instructions

The subject should be comfortably seated at the testing table directly in front of the Purdue Pegboard, which is placed on the table with the row of cups (Under the nameplate) at the top of the board. The far right and far left cups should have 25 pins in each to equal a total of 50 pins. For right-handed subjects, the cup to the right of centre should have 40 washers. If the subject is left-handed, the collar and washer locations should be on the reverse of centre. The following directions are for single subject testing and should be appropriately modified for group testing.

When the subject(s) is seated and ready to begin, say:

"This is a test to see how quickly and accurately you can work with your hands. Before you begin each battery of the test, you will be told what to do and then you will have an opportunity to practice. Be sure you understand exactly what to do."

Right Hand (30 seconds)

Begin by saying and demonstrating:

"Pick up one pin at a time with your right hand from the right-handed cup. Starting with the top hole, place each pin in the right-handed row. (Leave the pin used for demonstration in the hole.) Now you may insert a few pins for practice. If during the testing time you drop a pin, do not stop to pick it up. Simply continue by picking another pin out of the cup."

Correct any errors made in placing the pins and answer any questions. When the subject has inserted three or four pins and appears to understand the operation, say:

"Stop. Now take out the practice pins and put them back into the righthanded cup."

After the subject completes this task, say:

"When I say 'Begin,' place as many pins as possible in the right-handed row, starting with the top hole. Work as rapidly as you can until I say 'Stop.'"

"Are you ready? Begin"

Start timing when you say "Begin." At the end of exactly 30 seconds, say:

"Stop."

Left Hand (30 seconds)

Begin by saying:

"Pick up one pin at a time with your left hand from the left-handed cup. Place each pin in the left-handed row, starting with the top hole. You may insert a few pins for practice."

When the subject has inserted three or four pins and appears to understand the operation, say:

"Stop. Now take out the practice pins and put them back into the lefthanded cup."

After the subject completes the task, say:

When I say 'Begin,' place as many pins as possible in the left-handed row, starting with the top hole. Work as rapidly as you can until I say 'Stop.'"

"Are you ready? Begin."

Start timing exactly when you say "Begin." At the end of exactly 30 seconds, say:

"Stop."

Count the number of pins inserted and record the Left-hand score. This is the total number of pins the subject placed with the left hand. Leave the pins in the holes.

After the Right Hand and Left-Hand test batteries have been completed, the subject returns all pins to their proper cups.

Both Hands (30 seconds)

This test battery tests both hands working together. Begin by saying:

"For this part of the test, you will use both hands at the same time. Pick up a pin from the right-handed cup with your right hand, and at the same time pick up a pin from the left-handed cup with your left hand. Then place the pins down the rows. Begin with the top hole of both rows. (Demonstrate. Then replace the pins used for demonstration.) *Now you may insert a few pins with both hands for practice."*

After the subject has three of four pairs of practice pins correctly inserted, say:

"Stop. Take out the practice pins and put them back in their cups."

Then say:

"When I say 'Begin,' place as many pins as possible with both hands, starting with the top hole of both rows. Work as rapidly as you can, until I say 'Stop.'"

"Are you ready? Begin."

Start timing when you say "Begin." At the end of exactly 30 seconds, say *"Stop."*

Count the number of pairs of pins inserted (not the total number of pins) and record the score. The subject then returns the pins to the proper cups.

Right + Left + Both (Sum of scores)

This score is not based on a separate test; it is obtained from combining the test scores of the previous three test batteries. Add the scores recorder for Right Hand, left Hand and Both Hands; this is the score that you record for R + L + Both.

This score does not have to be recorded during the actual testing period. The Assembly test may begin immediately after both hands score is recorded.

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7.4. Monofilaments (Semmes- Weinstein or WEST)

This discriminative test is used to assess the threshold stimulus necessary for perception of light touch to deep pressure. The assessment requires the use of monofilaments that are available in either a 5- or 20-piece assessment kit.

Assessment technique

- Testing should be done in a quiet area with vision occluded.
- The subject's hand should be comfortable and rested on a table with palm uppermost to avoid moving the finger especially when using the larger filaments.
- Instruct the subject to respond when a stimulus is felt saying "Yes" or "Touch".
- When testing proceed from distal to proximal and from small to large monofilaments. It is our opinion that for routine Havs assessment it is only necessary to test pulp over dp. Avoid callus/ thick skin
- It is not necessary to test every area of the skin, checks may be done over areas innervated by different nerves.
- Press the filament at a 90-degree angle for 1.5 seconds against the skin until the filament bows and then remove. Gentle application for 1-2 seconds Bend of 3-5 mm
- Filaments 2.83 and 3.61 are applied three times in each spot. A single response indicates a positive result.
- For filaments 4.31, 4.56 and 6.65 only apply once.
- When the subject indicates a correct response record using the colour pencil that corresponds to the colour on the handle of the monofilament onto a hand diagram.
- The subject should only be asked when a stimulus is felt and not where they feel it.

Table 2 – Filament size

Green	2.83	Normal
Blue	3.61	Diminished light touch
Purple	4.31	Diminished protective sensation
Red	4.56	Loss of protective sensation
Red lines	6.65	Deep pressure sensation only

7.5. Two-point discrimination

This test is used to evaluate the perception of either one or two points of touch and to assess the quality of fine discriminative sensation. It is assessed using a small tool with prongs at fixed spacings from 2mm to 15mm. It should only be used when the skin has sensory return of light touch.

Assessment technique

- Testing should be done in a quiet area with vision occluded.
- The subject's hand should be firmly supported in order to avoid unwanted movement of the fingers.
- Demonstrate to the subject on a normally innervated skin area initially.
- Starting on a 5mm distance between the two points.
- Randomly place either 1 or 2 points parallel to the long axis of the finger along each phalanx until the skin blanches. Start distally and work proximally.
- The subject is asked whether 1 or 2 points has been felt. This should be repeated 10 times in each area.
- If 7/10 responses are correctly identified, then the distance is scored.
- If the responses are inaccurate then the distance between the two end points is increased by increments of either 1, 2 or 5mm depending on the suspected level of dysfunction.
- Equal pressure most be applied between the two points simultaneously.
- Two-point discrimination can be assessed as a static or moving pressure.
- To assess moving pressure – randomly place either 1 or 2 points then maintain contact and move distally.

RESULTS

Normal	<6mm
Fair	6-10mm
Poor	11-15mm
Protective	One point perceived
Anaesthetic	No points perceived

7.6 Moberg pick up test

The Moberg test can be used to assess functional sensational rather than threshold sensation. It is quick to perform and gives both the subject and therapist a clear demonstration of functional ability. It can only be used if a reasonable return of sensation has already occurred in the fingertips.

Test equipment

12 small metal objects that require precision grip including: wing nut, screw, key, large nut, large coin, small coin, safety pin, paper clip, square nut, hexagonal nut and a washer.

Assessment technique

- The objects should be placed alongside the container on the side being tested first.
- The subject is asked to pick up the objects one at a time from the tabletop and place them in the pot as quickly as possible. They should not slide the objects off the table.
- The time and manner of prehension is recorded. Discontinue if the test takes longer than 5 minutes making a note of how many objects have been correctly placed.
- Repeat the test with the opposite hand and then repeat this sequence 3 times on each hand.
- The same task is then repeated blindfolded for each hand 3 times.
- The vision occluded section should not be attempted if the sensory deficit is too severe.
- The subjects can also be timed for object recognition. Each object is randomly selected and placed in the subjects three-point grip on the affected side and then asked to identify the item. Repeat this twice until all the objects are identified but allow no longer than 30 seconds per object.

RESULTS

A comparison between the two hands can be made showing the results as a percentage to demonstrate change with further assessments. The uninjured hand is taken as the norm (100%) therefore if the injured hand is slower the score will be greater than 100%.

T = Test (injured hand)
S = Standard (uninjured hand)
T/S x 100 = % Standard Time

7.7. Shape/Texture identification (STI) test

This test is a quantitative test used for assessing tactile gnosis. The test is performed according to a standardised procedure and is based on active touch. The test is composed of four separate discs each containing three shapes (Cube, cylinder and hexagon) of different diameters (15mm, 8mm or 5mm). The test also presents raised dots in groups of 1, 2 or 3, spaced differently on each disc.

Assessment technique

Seat the subject at a table with the template containing the samples of the shapes and textures in front of them.

- Ask the subject to identify the shapes and textures presented, first with the uninjured hand.
- The test is performed using the pulp of either the Index or little finger only requiring a minimal motor element.
- The largest shapes should be used initially and the choice of 3 shapes presented randomly by spinning the disc.
- Repeat with the medium and finally the small shapes, offering each shape only once.
- This should then be repeated with the injured hand using either the index finger for median nerve injuries or little finger for ulnar nerve injuries.
- The disc with the largest spacing of raised dots should then be used and the number of dots should be presented randomly for identification with the uninjured hand.
- Repeat with the medium and finally small spacing of raised dots offering each texture only once and then repeat on the injured hand.

RESULTS:

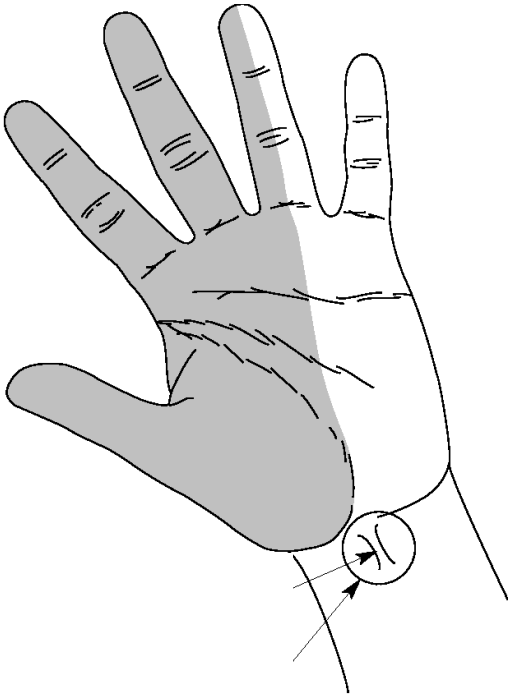
If all 3 shapes and textures on the disc are correctly identified the subject scores a point for each giving a potential range from 0-6 on each hand. The norm is taken to be 6 based on testing of 60 control subjects (Rosen and Lundborg, 1998). An increasing score will reflect recovery.

7.8. Tinel's sign

Elicitation:

Tap over the median nerve as it passes through the carpal tunnel in the wrist.

Positive response is usually a sensation of tingling in the distribution of the median nerve over the hand.

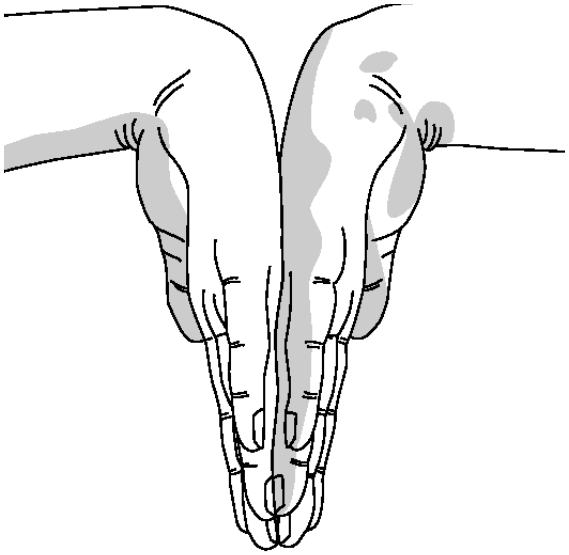


7.9 Phalen's manoeuvre

Elicitation:

Allow wrists to fall freely into maximum flexion and maintain the position for 60 seconds or more.

Positive response is usually sensation of tingling in the distribution of the median nerve over the hand.



7.10 Allen's Test

Anatomical basis

The hand is normally supplied by blood from both the ulnar and radial arteries. The arteries join in the hand. Thus, if the blood supply from one of the arteries is cut off, the other artery can supply adequate blood to the hand. A minority of people lack this dual blood supply.

i) Original Test

The original test proposed by Allen is performed as follows:

- Step 1 - The subject is asked to clench both fists tightly for 1 minute at the same time.
- Step 2 - Pressure is applied over both radial arteries simultaneously so as to occlude them.
- Step 3 - The subject then opens the fingers of both hands rapidly and the examiner compares the colour of both. The initial pallor should be replaced quickly by rubor.
- Step 4 - The test may be repeated, this time occluding the ulnar arteries.

Allen's test looks for abnormal circulation. If colour returns quickly as described above, Allen's test is considered to demonstrate normal circulation. If the pallor persists for some time after the subject opens their fingers, this suggests a degree of occlusion of the uncompressed artery.

ii) Modified Test

- Step 1 - In the modified Allen test, one hand is examined at a time.
- Step 2 - The hand is elevated, and the subject is asked to clench their first for about 30 seconds.
- Step 3 - Firm pressure is applied over the ulnar and the radial arteries so as to occlude both of them.
- Step 4 - Still elevated, the hand is then opened. It should appear blanched (pallor may be observed at the fingernails).
- Step 5 - Ulnar pressure is released while radial pressure in maintained, and the colour should return within 5 to 15 seconds.

If colour returns as described, Allen's test is considered to be normal. If colour fails to return, the test is considered abnormal and it suggests that the ulnar artery supply to the hand is not sufficient. This indicates that it may not be safe to cannulate or needle the radial artery.

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8. MANAGEMENT OF EMPLOYEES WITH HAND ARM VIBRATION SYNDROME AND CARPAL TUNNEL SYNDROME

Written by Dr Chandra Mutalik, Dr Dominic Haseldine and Dr Roger Cooke (August 2019)

Hand-transmitted vibration (HTV) can cause Hand-arm Vibration Syndrome (HAVS), and possibly also Carpal Tunnel Syndrome. HSE use the abbreviation v-CTS to refer to cases of CTS thought to be due to the effects of vibration. The following summarises an approach to the management of these cases at work and should be read in conjunction with existing guidance, including that from the Health and Safety Executive (HSE).

GENERAL RECOMMENDATIONS

The following applies to most cases of HAVS and v-CTS.

A. For employers:

- HAVS can lead to disability and a poor quality of life for the employee, but timely recognition and management of this condition might help to reduce progression and improve functional outcomes. There can be safety and legal consequences for the employer. The main aim of health surveillance is to detect HAVS or v-CTS at an early stage to help prevent it from progressing to a disabling loss of hand function.
- If work involves exposure to HTV, the employer is required to do a suitable and sufficient risk assessment, reduce the exposure as far as is reasonably practicable, consider the need for health surveillance and identify measures that need to be taken to meet the requirements of the control of Vibration at Work Regulations 2005. The Regulations provide a daily exposure limit value (ELV) and exposure action value (EAV). The ELV is the maximum amount of HTV an employee may be exposed to on any single day and it is 5 m/s2 A(8). The employer is required to undertake Health surveillance not only for employees likely to exceed at or above the EAV but also others whom the risk assessment identifies may be at risk. The EAV is 2.5 m/s2 A(8). There is no safe level for HTV exposure since there can be considerable variation in individual susceptibility to vibration, but vibration related ill health is unreported for exposure below 1m/s2 A(8).
- An HAVS assessment should include calculation of the worker's daily exposure to HTV using the Health & Safety Executive's (HSE) vibration calculator and the employer should ensure that suitable control measures are in place. The exposure to HTV should be reduced to as low a level as reasonably practicable (ALARP) in accordance with the Regulations.
- Workers should be provided with information, instruction and training on monitoring of daily exposure to HTV, regular maintenance of vibrating tools and the use of personal protective equipment (PPE).
- A new case or significant worsening of HAVS or CTS is reportable to the HSE under RIDDOR. The decision to report is managerial, reflecting a doctor's diagnosis and workplace exposure to HTV.

B. For employees:

The symptoms of HAVS include tingling and numbness in the fingers and a reduced sense of touch, temperature and pain perception, reduced hand dexterity and grip strength, cold intolerance and attacks of white finger on exposure to cold or damp conditions. v-CTS can also cause tingling and numbness in the fingers, pain in the hand and forearm, and weak grip strength. . The best course of treatment is early diagnosis and reduced exposure to HTV hence report any symptoms to the Responsible Person or occupational health promptly.

- If you are a smoker, consider smoking cessation as there is some evidence that this can improve the symptoms.
- If you experience attacks of white finger/blanching, ask your colleague or friend to take a photograph of the back and front of your hands during an attack. It can be helpful in the assessment and diagnosis of HAVS.

HAVS and v-CTS caused by exposure to HTV at work are Prescribed Diseases and the worker may be eligible for Industrial Injury Disablement Benefit.

SPECIFIC RECOMMENDATIONS

8.1.1 HAVS stage 1v and/or 1sn:

- Advise management and worker to reduce exposure to HTV at work ALARP in accordance with the Control of Vibration at Work Regulations 2005.
- Advise management to report the case to the HSE under RIDDOR.
- If the latent period suggests particular susceptibility to HTV, consider having more frequent HAVS health surveillance to monitor for progression of the disease. This could be done by an occupational health nurse or an occupational physician according to training and skill level.

8.2.2 HAVS stage 2v (early) and/or 2sn (early):

If an employee is diagnosed with HAVS stage 2 early, the aim is to prevent progression to stage 2 late or stage 3 because more severe forms of the disease are associated with a significant loss of function and disability.

- Advise management and worker to reduce exposure to HTV at work ALARP in accordance with the Control of Vibration at Work Regulations 2005 and certainly it should be less than the current level of exposure.
- Advise management to report the case to the HSE under RIDDOR unless previously reported.
- The frequency of health surveillance should be increased to monitor for progression of the disease. This could be done by an occupational health nurse or an occupational physician according to training and skill level.
- Sometimes it can be challenging to differentiate between stage 2 early and 2 late. Consider referral for tier 5 assessment (quantitative sensory tests of thermal and vibration perception) to assess whether late stage 2 has been reached. Tier 5 may also provide a second medical opinion and access to other specialised tests. If the symptoms are progressing within HAVS stage 2, the doctor should consider whether to advise the employee to cease further exposure to HTV at work.
- An employee with blanching and an abnormal Allen's test should have further investigations via their GP such as blood investigations, Doppler ultrasound or MR angiography to rule out other conditions.

8.1.2 HAVS stage 2v (late) and/or 2sn (late) and Stage 3v and/or 3sn

- Progression to the late form of stage 2 and 3 is an indicator of the employee being unfit for work with vibration, however, consider the following before recommending restriction on further exposure:
- The available clinical methods for assessment and prediction of progression of HAVS are not necessarily precise, therefore the decision to advise the employer that an employee should stop further exposure to HTV at work involves a significant element of clinical judgement. For this reason, consider using standardised tests (Tier 5) to obtain more accurate information.
- Management of existing cases of late stage 2 and 3 HAVS is potentially different as more information may be available about the rate of progression over time. HSE Guidance L140 advises that an employee who has been monitored under health surveillance for a long period of time and has shown no progression of symptoms, and who fully understands the risks involved in ongoing exposure, may be allowed to continue work with limited exposure to HTV under frequent health surveillance. It is important to obtain employee's job description, risk assessment findings and details of control measures in place.
- Advise management to report the case to the HSE under RIDDOR unless previously reported.
- If there is an element of co-existing CTS, then this should be investigated with multi-segmental nerve conduction tests before diagnosing sensorineural HAVS.
- Depending on the severity of symptoms and functional impact, consider giving advice on whether the condition/impairment is likely to be covered as a disability under the Equality Act 2010.

8.2.4 Vibration-related Carpal Tunnel Syndrome (v-CTS)

The presentation of the sensorineural component of HAVS and CTS can be very similar and often indistinguishable. The following points should be considered while offering advice to the employer and employee:

If CTS is suspected:

- Advise the employee to consult a GP to consider multi-segmental nerve conduction tests to assess the severity of CTS and guide management.
- If the CTS due to work with vibratory tools is suspected, advice management and worker to reduce exposure to HTV at work ALARP in accordance with the Regulations.
- There is no evidence that HTV leads to exacerbation of pre-existing compressive CTS but work with vibrating tools involves other risk factors for CTS. The employer should undertake an ergonomic risk assessment to reduce the risk of repetitive and sustained forceful wrist activities, particularly with the wrist in a non-neutral position.

If the diagnosis of CTS is confirmed:

- The employee may have to be removed from the exposure to HTV until he/she receives treatment.
- CTS is a reportable disease under RIDDOR where the person's work involves regular use of percussive or vibrating tools. The employer has a legal duty to report it to HSE once informed of the diagnosis in writing by a medical practitioner.

After CTS treatment:

Recommendations for a return to work with exposure to HTV should be made on an individual basis and the employee should be informed of the possible return of symptoms with continued exposure.

- Advise management and worker to reduce exposure to HTV at work ALARP and have more frequent health surveillance to identify the re-emergence of symptoms of CTS.
- The employer should undertake an ergonomic risk assessment of the job activities to assess other risk factors for CTS and to try to reduce the risk of relapse.
- If there is a relapse of CTS, consider permanent restriction on exposure to HTV at work.

9. OTHER VIBRATION-RELATED CONDITIONS

Written by: Nikla Rai Specialist Practitioner in OH (September 2018)

Consideration of HAVS exposure should be considered if the following medical conditions are disclosed at Tier 1 (Base Line) Medical Assessment, or subsequently:

9.1 Differential Diagnosis

Primary Raynaud's Phenomenon

Screening for family history of Raynaud's phenomenon should be included at Tier 1 as well as looking for any evidence of the presence of Raynaud's phenomenon prior to vibration exposure, where possible. The reason for this is because some workers often begin to work with vibrating tools in their late teens and early 20's before the symptoms of primary Raynaud's phenomenon are obvious. Omitting this baseline screening could potentially blur identification of symptoms at a later stage making it difficult to differentiate the vascular component of HAVS from primary Raynaud's phenomenon, especially if the symptoms begin within a few years of starting work.

Primary Raynaud's phenomenon is typically in a younger age group, bilateral, symmetrical and may be associated with other vasospastic phenomena such as migraine.

Ageing and other conditions

The effects of ageing on skin blood flow should be assessed independently from those which may arise from HAVS. Other conditions which may affect blood flow in the hands, or cause Raynaud's phenomenon, include the following:

Vasospastic conditions (connective and mixed connective tissue disorders)	Occlusive conditions
• dermatomyositis • hypothyroidism • systemic lupus erythematosus • systemic sclerosis (limited & diffuse) formerly known as CREST	• atherosclerosis • cervical rib • cold haemagglutinins. • hyperfibrinogenaemia. • leukaemia. • polyarteritis nodosa. • thoracic outlet syndrome. • polycythaemia rubra vera. • thrombo-embolic disease • vasculitis.

9.2 Other Conditions

Hypothenar and Thenar Hammer Syndromes

This condition is caused from a deficiency of the blood flow within the hand. Hypothenar hammer syndrome is caused by trauma to the hand or caused by reoccurring compression, squeezing, or hammering of the hand. This condition is not to be confused with a HAVS related problem. Hypothenar hammer syndrome affects the distal parts of the ulnar artery supplying the hand, and thenar hammer syndrome affects the distal radial artery.

Guyon Tunnel Syndrome

Also known as Ulnar Tunnel Syndrome is a compression of the ulnar nerve in Guyon's canal. It is caused by repeated and prolonged pressure applied to the base of the palm resulting in symptoms in the 4th/5th digits and ulnar side of the palm (depending on the level of compression).

Dupuytren's Contracture

There have also been reports of an increase in incidence of Dupuytren's contracture, a thickening of the fibrous tissue beneath the skin of the palm, in those using hand-held vibrating tools. In 2014, the UK Industrial injuries Advisory Council considered the evidence about vibration and Dupuytren's fibrosis and concluded that the epidemiological evidence supported a relationship, and that the condition should be prescribed for those with ten years or more exposure to vibration (for more than 2 hours a day's three days a week) and who had fixed finger flexion deformity.

Neuropathy

The neurological components of HAVS should be established independently from the following;

- alcoholic peripheral neuropathy
- cervical spondylosis
- diabetic peripheral neuropathy
- hemiplegia
- multiple sclerosis
- neurofibromatosis
- poliomyelitis
- spinal cord compression
- syringomyelia

Occupational neurotoxins should be considered, including:

- Acrylamide
- Antimony
- Arsenic
- Carbon disulphide
- Diethyl thiocarbamate
- Lead (inorganic)
- Mercury compounds
- Methylbutyl ketone
- n-hexane
- Organophosphates
- Thallium
- TOCP.

It is also advisable that that the effects of medication should be excluded. Examples of medications that may be associated with neuropathy are:

- Chloramphenicol
- Nitrofurantoin
- Cyclosporine
- Perhexiline
- Ethambutol
- Phenytoin
- Gold
- Polymyxin
- Indomethacin, statins
- Isoniazid
- Streptomycin
- Metronidazole
- Vincristine.

Hearing loss

It is known that high frequency hearing loss occurs more commonly in those exposed to hand transmitted vibration than those with no such exposure but similar levels of noise exposure. However, given the possible noise exposure of those working with vibratory tools, the presence of deafness should not be used to assist in the diagnosis of HAVS.

10. THE PREPARATION, RECORDING AND AUDIT OF HAND ARM VIBRATION CASE NOTES AND REPORTS

Written by Dr Danny Wong / Dr Simon Sheard (November 2018)

10.1 Purpose

This procedure describes how subject encounters for Hand-Arm Vibration Syndrome (HAVS) assessment are recorded in medical records in accordance with best practice in the form of an audit.

10.2 Scope

The recording of all subject HAVS clinical encounters including clinical and routine records either paper or electronic.

10.3 Definitions

HAVS Clinical encounter – all meetings between subject and nurse/doctor for clinical purposes related to Tier 1,2,3 and 4 HAVs

Clinician = physician, nurse, technician

10.4 Procedure for Audit of Case Notes

Auditors Auditors may be a nurse and/or an occupational physician who are familiar with the clinical process, audit procedure and the health assessment to be audited. The nurse/occupational physician will not audit their own health assessments.

Selection of records A date is selected at random by the auditor and the first records (number to be agreed) of HAVS assessments carried out from that date by a doctor and/or nurse to be audited will be selected by the auditor.

Audit of records It is recommended an audit of notes be carried out on an annual basis. This is carried out by the auditor/s. The audit checklists are in the appendices to this paper.

Reporting of results Individual nurse/doctor feedback will consist of the return of the completed checklists for each assessment audited, and discussion of significant conformities/improvement opportunities with the auditor. Documentation of the feedback will be at the auditor's discretion, but, as a minimum, discussion of significant findings/improvement opportunities must be documented and signed by both parties. The result may also be used for doctor, nurse revalidation/clinical appraisal.

REFERENCES

- NHS Plus V03: OH Consultations Policy
- SEQOHS - https://www.seqohs.org/
- Hand-arm Vibration – The Control of Vibration at Work Regulations 2005 L140
- The Nursing and Midwifery Council Guidelines dated 2004 'Guidelines for records and record keeping.
- Cumbria and the North East - Medical Appraisal & Revalidation

11. LEGAL CONSIDERATIONS

Main Statutory Guidance relating to Hand Arm Vibration

1. *Health and Safety at Work, etc. Act 1974*
2. *The Control of Vibration at Work Regulations 2005*
3. *The Provision and Use of Work Equipment regulations*
4. *The Management of Health and Safety at Work regulations*

Other relevant publications

1. 'Hand-arm vibration' – Control of Vibration at Work Regulations 2005, HSE books L140 (2020)
2. HSE. Hand arm vibration -: Inspection and Enforcement Guidance 2020

Updated Guidance 2020 HSE, Hand Arm Vibration: Inspection and Enforcement Guidance, (July/August2020) – available at https://www.hse.gov.uk/foi/internalops/og/index.htm

This document replaces the HSE 2010 topic inspection pack is intended for the use of inspectors inspecting work activities involving risks from hand arm vibration. It is an "open government" document, and therefore accessible to all. By identifying issues which are regarded by HSE as relevant to control of risks from hand transmitted vibration, it may also assist others involved in reviewing such issues within workplaces. It is intended to cover all aspects of HAVS and CTS relevant to HSE inspection and enforcement, and the following notes identify only some of the issues that will be important to address.

Appendix 2 of this document is a table of factors to be considered in HAV inspections. Among many items the following are included for consideration by inspectors:

1. whether the OH provider provides the employer with grouped anonymised health surveillance results (for more than 5 employees), and
2. whether the OH provider has advised the employer (subject to employee consent) to reports cases of CTS and new and worsening cases of HAVS under RIDDOR

In respect of prosecution or enforcement action, this document states that "prosecution should be considered when there is a single case of HAVS stage 2 late or stage 3, or multiple cases of HAVS stage 1 and stage 2 early and late, AND there are/ were exposures regularly at/ above the EAV that are / were not controlled and managed SFAIRP to prevent harm". CTS is regarded as a significant health effect but reports of CTS alone should not normally result in prosecution.

Guidance is provided for industry-specific good practice in appendix 6 for the following sectors:

- Foundries (Table 1A);
- Heavy Fabrication (Table 1B);
- Construction (Table 1C); and
- General management of HAV risks (Table 2)

12. WHOLE BODY VIBRATION (WBV)

Written by Dr Roger Cooke

12.1 Introduction

The effects of vibration exposure may be regional (sometimes referred to as segmental) or general (whole body vibration, WBV). This distinction is important when considering symptoms attributed to vibration exposure.

12.2 Regional effects of vibration

Regional effects are most commonly seen in the fingers and thumbs, as hand arm vibration syndrome (HAVS), although it is plausible that regional vibration could occur elsewhere, such as in the toes or feet, where those parts of the body are exposed to vibration.

The two main effects of hand arm vibration exposure are vascular, causing Raynaud's phenomenon, and sensori-neural causing sensory symptoms of tingling and/ or numbness as a result of damage to the nerve endings and associated fine nervous tissue in the fingertips. Because that is where the damage is caused the associated sensory symptoms are limited to the digits, and do not affect either the palms, the wrists or the forearms. The neurological component of HAVS is referred to as the sensorineural component, reflecting the fact that it is sensory damage that is caused by vibration rather than an effect on motor function of the nerves.

Carpal tunnel syndrome may occur in association with use of handheld vibratory tools, although there is debate as to whether that is due to ergonomic and postural effects, or the vibration exposure itself. Where CTS occurs, for whatever cause, sensory symptoms may affect the digits, palm and lower part of the forearm, along with motor effects.

If one accepts that an effect of regional vibration exposure to the feet would follow the same pathological course (which is hypothesis and is not proven), then one might expect a similar process of development of symptoms in the feet if due to vibration. However, the effect of localised vibration on the feet is poorly defined. In a 2010 report[i] the authors noted that "*a condition analogous to HAVS might occur in the feet after lower extremity vibration exposure is biologically plausible, though not well studied*". In that case report there was no neurological abnormality of the feet. A later review in 2014 referred to *"foot transmitted vibration (FTV)"*, being distinct from hand transmitted vibration or whole-body vibration[ii]. They noted that "little is known about the characteristics of occupational FTV or clinical implications with prolonged exposure", and that a clear dose response relationship has yet to be proven. That review cited only two published reports of "vibration white toes". In one of those there was a mild neurological deficit in the affected foot. The review concluded that *"study is required to . . . better characterize and control foot transmitted vibration"*, and that *"epidemiological evidence is required to link (foot vibration) exposure with injury"*.

Vibration white toe may occur where there has been vibration exposure of the great toe due to using the foot to guide the point of a jackhammer. That is an effect of local or regional vibration exposure rather whole-body vibration.

Neurological effects of regional vibration exposure to the feet are poorly defined or reported. Hence, while there is a plausible argument that such effects may occur, as they do in the fingers; that has not been confirmed by epidemiological or other studies.

12.3 Whole Body Vibration

Whole body vibration (WBV) refers to the generalised effects of exposure of the whole body to vibration, usually by sitting in a tractor or other vehicle, but also when an individual is standing on a vibrating platform. Back pain, sciatica and lumbar disc degeneration are the most commonly discussed features of WBV. The health effect of WBV on the lumbar spine are supported by a significant body of research[iii]. Health effects on the cervical spine, autonomic and gastro-intestinal systems are not supported by evidence[iv].

The Health and Safety Executive (HSE) has published guidance on WBV – document reference L14[v]. That document focuses on back pain associated with WBV exposure. Griffin describes the effects of whole-body vibration, and divides those effects into five groups, being degraded comfort, interference with activities, impaired health, perception of low-magnitude vibration and the occurrence of motion sickness. An effect of individual organ resonance remains a possibility – estimated at being about 4-5 Hz in the lower back and 3-5 Hz in the neck – although the effect of damping by other organs, joints etc is likely to make the practical effect of this difficult to assess.

Voluntary and involuntary muscular contraction may be particularly relevant, but not limited to occurring around the resonant frequency, and contribute to the development of symptoms. However, the pathophysiology of any effects of WBV remains unclear, with dose-response relationships undefined, and exposure limits apparently relating to discomfort rather than pathology. The Control of Vibration at Work regulations 2005 specify

a daily exposure action value (EAV) of 0.5 m/sec2 HSE recommends an A(8) level of 0.5 as an EAV and an exposure limit value (ELV) of 1.15 m/sec2. The HSE provides useful additional information on its website - http://www.hse.gov.uk/vibration/wbv/index.htm

Health surveillance in respect of WBV is unlikely to be of any benefit, although pre-placement screening for pre-existing low back pain may be useful. Provision of information and training on risks is recommended and should include advice to report symptoms.

12.4 HSE Guidance and Control Measures

HSE leaflet INDG 242 is advice for employers entitled *"Control back pain risks from whole body vibration".* HSE guidance L141 refers to whole body vibration and is recommended reading for those addressing issues relating to WBV.

A range of measures are available to reduce risks from WBV, including

- Elimination or reduction of exposure, for example by replacing manned with unmanned machines such as remotely controlled conveyors;
- Ensuring that work equipment (vehicle) is of appropriate ergonomic design through
  - Choice of vehicle
  - Operability without stretching and twisting – hence good visibility
  - Easy access and egress to and from the vehicle using handholds and footholds, and minimising climbing or jumping
  - Unimpeded access to manually loaded areas
  - Ensuring sufficient space and facilities for rest periods if the machine cab is the sole workplace of the machine operator, including break time
- The choice of seat and seat suspension
- The choice of tyres
- Regular maintenance of vehicles
- Regular maintenance of terrain
- Reducing the need to transport materials,
- Limiting the duration of exposure
- Ensuring adequate rest periods
- Protecting employees from cold and damp

REFERENCES AND FURTHER READING

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- Griffin M *Handbook of Human Vibration* publ. Elsevier 1st edn 1990 ISBN 0-12-303041-2
- HSE, *Control the Risks from Whole Body Vibration* INDG242 Revision (1)
- HSE, Vibration Calculator
- HSE, *Drive Away Bad Backs,* INDG404

13. ADVICE FOR UNDERTAKING ASSESSMENTS DURING COVID-19 PANDEMIC

The underlying principle regarding health assessments undertaken while Covid restrictions are in place is that a formal risk assessment be undertaken to determine the level of Covid infection risk to both the employee and the occupational health provider. That risk assessment must consider national and local requirements and guidance, as well as expert evidence.

The following documents were regarded as relevant and appropriate at the time of publication, but may require revision depending on local circumstances and changes in advice regarding control of the Covid pandemic.

13.1 Remote Assessment of Hand Arm Vibration Syndrome and Carpal Tunnel Syndrome

Prepared by Drs R Cooke & I Lawson (20th April 2020).

Introduction and Background

13.1.1 Restrictions on face-to-face consultations arising from the Covid-19 has potential to restrict statutory health surveillance.

13.1.2 Guidance was issued by HSE stating that "The usual tiered approach to health surveillance will apply. Questionnaires can be administered remotely. Where there is a problem, a review can be undertaken by telephone and then a judgement can be made on whether to see the worker face to face and, if so, how to do so safely."

13.1.3 At the time of writing this paper, advice from NHS England and the BMA is that face to face consultations should be avoided unless absolutely necessary. In that context, it is our advice that during the period of restrictions associated with Covid-19, face-to-face consultations for tier 3 or tier 4 HAVS should only be undertaken following discussion with a senior OH colleague, and the reasons for that should be clearly recorded in the notes, along with a COSHH risk assessment relating to the consultation.

13.1.4 This paper is intended to assist those who are asked to undertake telephone assessments.

13.1.5 As with any health surveillance for HAVS, there are several important potential outcomes, being

a. Does the employee have a condition related to hand transmitted vibration exposure or use of vibratory tools – i.e. HAVS or CTS? and if yes
b. Is this a new diagnosis, and
c. What is the staging of the HAVS?
d. Consequent on the above, advice should be offered to employee and employer regarding risk assessment, further exposure and RIDDOR reporting where appropriate.

13.1.6 These principles are unchanged, and the need for remote consultations requires only minor amendments to the process used.

13.1.7 In general terms, a good history provides most information to allow clinical diagnosis in many medical conditions; this is particularly true in Hand Arm Vibration Syndrome (HAVS). Hence in many cases a remote consultation, which allows ample time for an adequate occupational and medical history to be taken, will allow a diagnosis and staging to be made. There may be a particular challenge in addressing the sensorineural damage due to vibration exposure, and suggestions are made as to how this may be addressed.

13.2. General principles of remote assessments.

13.2.1 The general principles of remote telephone assessment were addressed in an SOM Webinar presented by Dr Lucy Wright on 2nd April 2020.

13.2.2 It is recommended that those undertaking remote HAVS assessments review that presentation, or another similar one, to ensure that they are suitably prepared for the process.

13.2.3 When a remote assessment is undertaken, it is prudent to record in the notes and report ("health record") the reasons why the assessment was undertaken in this way, referring to current HSE/ PHE/ NHSE Guidance at the time.

13.2.4 Where advice is given as a result of a telephone consultation, that should include comment as to whether the conclusions and advice are definitive or interim pending a face-to-face assessment. If advice is identified as interim, the employee and employer should be made aware that when a face-to-face assessment is undertaken, that advice may be amended as a result of the findings of that face-to-face assessment.

13.3 Health Surveillance for hand arm vibration exposure at work

13.3.1 Regulation 7 (2) of the Control of Vibration at Work regulations (2005) notes that health surveillance shall be intended to prevent or diagnose any health effect linked with exposure to vibration at work.

13.3.2 The latest HSE Guidance to the Control of Vibration at Work regulations – document L140 2nd edition (2019) – provides details of the tiered approach.

Tier 1 The initial assessment is by a short questionnaire, which should be completed and sent in confidence to an occupational health professional. That process should remain unchanged, with the questionnaire being sent to and completed by the employee, who returns it to the OH provider. Alternatively, an OH provider may administer the questionnaire, over the telephone, using the questions as suggested in Appendix 9 of the HSE Guidance.

Tier 2 Annual screening is also by questionnaire, and the same approach can be used as for tier 1. For tier 2 screening a responsible person may administer the questionnaire, but the employee retains the option that it be done by an occupational health professional if there is concern about confidentiality relating to symptoms.

Tier 3 This is more detailed assessment by an appropriately qualified and trained OH professional. A good history can be elicited over the telephone – using HSE Guidance and the suggestions in Section 5 of the SOM document on HAVS. Again, this part is unchanged from a face-to-face consultation, except that:

a. Particular care may be required to confirm the nature, and extent of colour changes of any suspected vasospasm. Where possible, if an individual has declared colour changes at tier 1 or tier 2, they should be asked to complete a Katz diagram prior to the tier 3 assessment Similar diagrams may also be used to define the distribution of tingling or numbness. Suitably identifiable photographs of colour changes may be available and sent by SMS or email.

b. While clinical examination is not possible, the availability of video conference facilities may make it possible to look at the hands and ask the employee to demonstrate the areas affected by colour changes or sensory symptoms. It may be possible to see severe degrees of thenar muscle wasting with the hands placed in the 'prayer' position close to a webcam.

The potential outcomes of a remote tier 3 assessment are:

1. Symptoms are not suggestive of HAVS or CTS. These should then be addressed as any occupational health assessment, and advice offered in line with the nature of the condition and any functional impairment relating specifically to the individual's work.
2. Symptoms are suggestive of HAVS but are unchanged from previous assessments. Review needs for restrictions. Arrange further telephone review in 3 months unless COVID restrictions have been lifted, in which case arrange face-to-face assessment as soon as possible.
3. Symptoms are suggestive of HAVS that has progressed since the last assessment. Refer for tier 4 assessment.
4. Symptoms suggestive of carpal tunnel syndrome (on basis of confirmed diagnosis from a doctor or using Primary care Rheumatology Society criteria - see below - or those at Appendix 8 - paragraph 21 of HSE L140) – refer for tier 4 assessment.
5. Where referral for tier 4 assessment is recommended, consideration is required of the need to restrict exposure to hand transmitted vibration until the results of the tier 4 assessment are available. Rapid escalation is appropriate if presumptive staging suggests severe or rapidly progressing HAVS or CTS.

Tier 4 assessment is undertaken by a suitably qualified and experienced doctor.

As noted above, a diagnosis of Raynaud's phenomenon is based on a detailed history with additional support from suitably validated photographs, and Katz diagrams.

Additional history should be taken as with a face-to-face examination – in order to elicit whether or not an alternative cause of the RP is likely. Actions consequent on a diagnosis or grading made in this way should not differ from those made in a face-to-face consultation.

Ensorineural assessment may be more challenging.

A diagnosis of stage 1sn may be made on the basis the history alone, but diagnosis of stage 2sn or 3sn requires clinical assessment.

Stage 2sn is likely to be difficult to assess remotely since it relis on evidence of reduction of sensory perception. In the current circumstances, it is suggested that the following distinctions are made:

- **1sn and early 2sn** – on basis of a history of intermittent tingling and/or numbness – i.e., lasting less than 2 hours
- **late 2sn** – on basis of persistent tingling or numbness lasting more than 2 hours

Stage 3sn with constant numbness and/ or tingling a history suggesting loss of dexterity and evidence of reduced manipulative function.

A **modified Moberg pick up test** may be helpful if videoconferencing is available – see Appendix 3. This is not validated and can only be used as a guide for clinical interpretation. If this suggests poor manipulative dexterity/ function, due to HAVS rather than any other condition that may be present – e.g., arthritis, this should be regarded as possibly indicating late stage sensorineural HAVS.

Remote **Phalen's** test may be required to assist with diagnosis of carpal tunnel syndrome – see Appendix 4

A **fixed flexion test at the elbow** could also be performed if cubital tunnel syndrome is suspected from the history.

13.4 Advice to employers

Reports should be offered to employers in the same way as with face-to-face assessments, although those reports should make it clear that the findings and recommendations reflect a remote assessment with/ without telephone video conferencing.

In this context it is appropriate to indicate that the diagnosis and staging may alter once a face-to-face examination is undertaken. Where practicable the advice should be identified as interim or temporary; this is likely to be particularly important in respect of the longer-term position on vibration exposure that could potentially affect a worker's employment. A reported history of functional problems resulting from reduced grip strength, or that otherwise impact on an ability to work safely should be addressed irrespective of the presumptive nature of the remote assessment.

In line with HSE advice, those who are assessed remotely should be offered further remote assessment in 3 months' time, or face to face assessment as soon as possible after the COVID restrictions are lifted, whichever is earlier.

13.5 RIDDOR

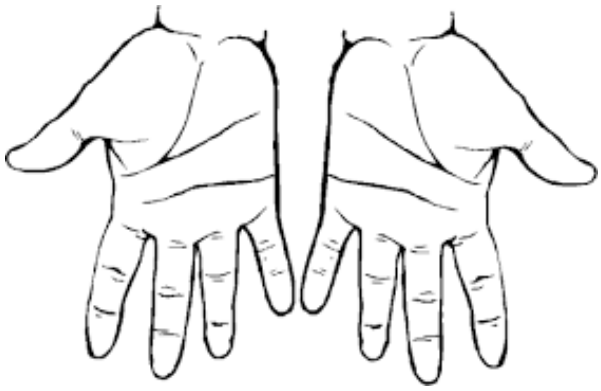
A clinical diagnosis by a registered medical practitioner of HAVS or CTS meets the criteria for reporting under RIDDOR s2. Face-to-face consultation may not be required to diagnose either condition, so, if/ when the telephone consultation is sufficient to yield a confident diagnosis, RIDDOR advice should be offered accordingly.

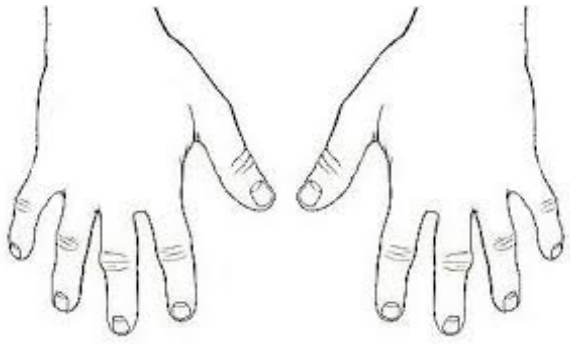
However, where a diagnosis is in doubt, it is appropriate to regard that as un-confirmed, and delay reporting a formal diagnosis (and therefore not trigger RIDDOR reporting) until a face-to-face examination can take place. This will be a matter for clinical judgment in each individual case and should be clearly documented in the clinical records.

13.6 Audit

Those who undertake telephone assessments in this way are asked to co-operate in an audit of the process. This is not regarded as research but is a potential clinical improvement activity, designed to address short term constraints on our practice. However, it is possible that learning from this will allow us to review our practice in respect of health screening, which requires us to audit and review the results of the amended process.

Appendix 1 – Katz diagram





Appendix 2 - Diagnosis of CTS

Primary Care Rheumatology Society Criteria for the diagnosis of Carpal Tunnel Syndrome
(ref: Burton C, Chesterton L, Davenport G Diagnosing and Managing carpal tunnel syndrome in primary care British Journal of General Practice 2014. 64: 262–263)

Ask employee "Do you have numbness or tingling in your wrist, hand, or fingers?"

If answers "no" – not carpal tunnel syndrome (CTS)

If answers "yes" proceed to following questions –

1. Do your symptoms spare your little finger?
2. Are the symptoms worse at night?
3. Do the symptoms wake you up at night?
4. Have you noticed your hand is weak; for example, have you found yourself dropping things?
5. Do you find shaking your hand, holding your hand, or running it under warm water improves your symptoms?
6. Are the symptoms made worse by activities such as driving, holding a telephone, using vibrating tools, or typing?
7. Have splints or injections helped with your pain if you have had it in the past?

If 3 or more of these are answered "yes" diagnose CTS

If 2 of these are answered "yes" proceed to Phalen's test – if positive diagnose CTS; if negative, consider other causes.

Appendix 3 – Modified Moberg pick-up test

The Moberg test can be used to assess functional effect of altered sensation. The following is a suggested method of undertaking this test when videoconferencing is available.

Prior to the telephone consultation, the employee should be asked to obtain 10 objects and place them on a table next to a biscuit tin or similar sized container. Suitable objects include wing nut, screw, key, large nut, large coin, small coin, safety pin, paper clip, square nut, hexagonal nut, and a washer.

- The objects should be placed alongside the container on the side being tested first.
- The subject is asked to pick up a specified object one at a time from the tabletop and place them in the tin as quickly as possible. They should not slide the objects off the table.
- The time and manner of prehension is recorded. Discontinue if the test takes longer than 5 minutes making a note of how many objects have been correctly placed.
- Repeat the test with the opposite hand and then repeat this sequence 3 times on each hand.
- The same task is then repeated for each hand with the employee looking away.

This is a subjective test intended to assist the examiner assess whether there is evidence of impaired manipulative dexterity attributable to HAVS. If there is such evidence, the employee should be provisionally graded at stage 3sn

Appendix 4 – Remote consultation Phalen's test.

The classical Phalen's test is undertaken by asking the individual to sit at a table and rest their elbows on the table with forearms pointing upwards and palms away from them. They are then asked to let their palms drop forwards – i.e., away from them as far as they can. A positive result is elicited by the subject noting the onset of sensory changes in the area of the median nerve or reproduction of the symptoms of which they complain. The test can be stopped when the subject makes such a complaint or after 60 seconds, whichever is longer.

Done remotely this can be explained to the employee, and the feedback noted. Teleconferencing allows visual confirmation that the employee is undertaking the test appropriately.

However, on the assumption that there is good understanding by the employee, a positive result should be accepted for use in the Primary care Rheumatology process described above.

Appendix 5 – HAVS remote assessment audit form

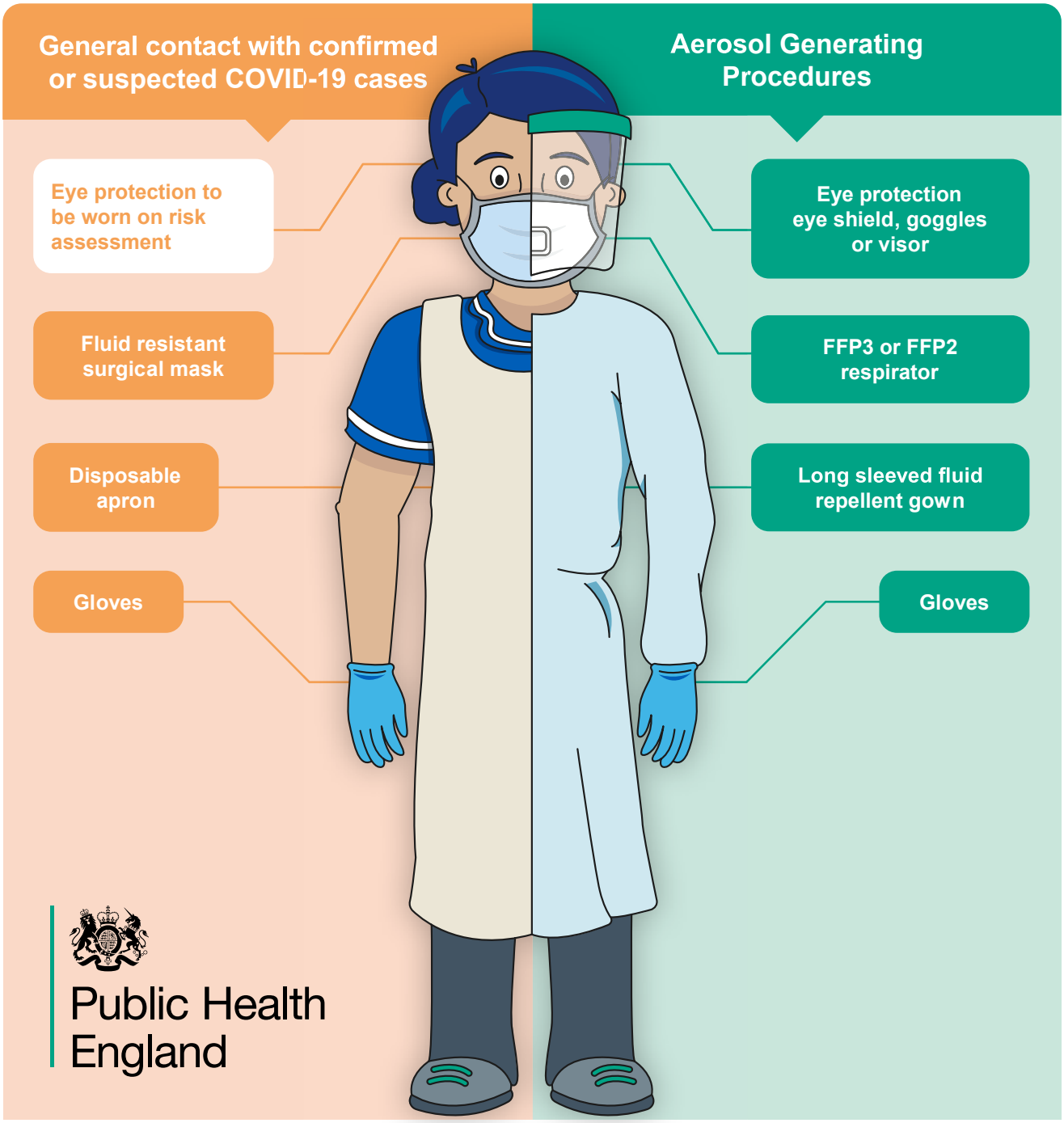
This form should be completed by the clinician undertaking the telephone and face-to-face assessment. The purpose is to undertake a comparative review the outcome of the telephone assessment and face-to-face approach.

Those participating in this audit are asked to complete the forms and submit after the face-to-face assessment has been completed. This is an Excel spreadsheet that can be downloaded and completed at the time of each surveillance. No patient/ employee names should be included but each OH Practitioner using the form should assign a patient/ employee identifier for their own reference.

13.7 Infection Control Checklists For Undertaking HAVS Assessments

Prepared by Ms Nikla Rai

Done	Setting up the environment	Notes
	Designate a room – Good ventilation, well-lit and private.	No drinks in open cups permitted in clinic room No food permitted in clinic room Drinking out of water bottles to be done at personal risk.
	Limit chances of distractions and interruptions.	
	Set out adequate supplies, such as pens, documents, equipment.	
	Ensure there is adequate supply of PPE and hand cleaning facilities.	
	Ensure there is adequate supply of equipment clean-ing materials.	
	Use disposable equipment where possible.	
	Clinic appointment letters to service users to advise that waiting times should be limited to no more than 15 minutes to allow time for consent forms to be completed and to maintain social distancing. Service users to ideally attend alone where possible.	
	FOR CLINICS WITH WAITING ROOMS	
	Ensure there is adequate signage to maintain a 2m distance. Use tape to cover/or remove excess chairs.	
	Ensure there is adequate signage to advise wear a mask at all times.	
	Ensure that there is provision of hand gel in waiting area.	
Done	**Level 1 Infection Control Equipment**	**Notes**
	Single pair of gloves.	For face-to-face contact with Service Users within 2 metres.
	Disposable plastic apron.	***Donning steps*** – clean hands, apron on, mask on, visor, clean hands, gloves.
	Fluid repellent surgical masks for both clinician and service user.	
	Eye protection if you feel there is a risk of service user coughing, or splash or droplet exposure.	***Doffing steps*** – gloves off, clean hands, gown off, don't bend forward, visor off, remove mask, remove visor, remove glasses, remove mask.
	Wipeable shoes.	
Done	**Level 2 Infection Control Equipment**	**Notes**
	Double pair of gloves to allow for changing top pair of gloves between procedures. Bottom gloves should overlap the gown sleeves.	For face-to-face contact with service users if clinic room has poor ventilation.
	Long sleeved fluid repellent gown.	
	Fluid repellent surgical mask for service user.	
	FFP3 respirator (for clinician).	
	Eye protection (should be disposable).	
	HazMat outer covering for clinician (should be disposable).	
Done	**Post Assessment Checklist**	**Notes**
	Please make sure that you dispose of PPE correctly by putting disposable equipment in clinical waste bins only before leaving a clinical area.	Ensure all reusable equipment is completely dried after cleaning before it is reused.
	Clean all equipment with anti-bac cleaners in between appointments. Allow time for the clinic room to be well re-ventilated in between appointments	
	Clinic waste of PPE to be held for 72 hours before disposal if no specific arrangement for incineration of waste made.	


General contact with confirmed or suspected COVID-19 cases
Aerosol Generating Procedures
Eye protection to be worn on risk assessment
Fluid resistant surgical mask
Disposable apron
Gloves
Eye protection eye shield, goggles or visor
FFP3 or FFP2 respirator
Long sleeved fluid repellent gown
Gloves
Public Health England

APPENDIX A
CLINICAL AUDIT RECORD KEEPING TOOL

Name of doctor/nurse:	
Name of auditor:	
Date of audit:	

Instructions for completing the checklist:

Please tick the appropriate box, and (if required) please add comments in allocated box. **Do not write in the shaded areas.**

No.	Question	Yes	No	N/A	Comment
1	**Were the previous notes present at time of the assessment?**				
2	**Assessment of folder/electronic file to procedural standard:**				
2.1	Is there a record of the subject's surname?				
2.2	Does it have the subject's first name?				
2.3	Does it have the subject's date of birth?				
2.4	Does it have identification of department?				
2.5	Are the continuation sheets, if any, tagged?				
2.6	Is the correspondence in chronological order?				
3	**HAVs Report**				
3.1	Is there a copy of the report in the notes?				
3.2	Does the report have the subject's DOB?				
3.3	Does the report have the subject's name?				
3.4	Does the report have the subject's address?				
3.5	Does the report have the subject's occupation?				
4					
4.1	Is there a record of when the subject was seen and where?				
4.2	Does the report have the reason for attendance?				
4.3	Does it state the subject is fit to work with continued exposure to vibration tools with or without adjustments?				
4.4	Does it state the subject is fit to work in their substantive job role?				
5.					
5.1	Does the report refer to the Equality Act with reasoning?				

5.2	Does the report refer to current or recent level of daily vibration exposure?				
5.3	Is a Hand Arm Vibration Syndrome (HAVs) or Carpal Tunnel Syndrome (CTS) diagnosis supported?				
5.4	Staging stated as per HSE guidance?				
5.5	Has advice to employer about RIDDOR for HAVs / CTS been considered?				
5.6	Is there advice about future exposure? E.g. advised to reduce exposure as far as practicable or to below 100 HS points?				
5.7	Recommendation for further assessment?				
5.8	Review period clear?				
5.9	Has the subject of the report been copied into the report?				
5.10	Has consent been gained to send the report?				
6	Can the decision on fitness be justified?				
7	Is the overall impression one of good clinical management?				
8	**Are clinical notes:**				
8.1	Legible?				
8.2	Is there acknowledgement that a risk assessment has been carried out by the employer?				
8.3	Do the notes record the presenting complaint? E.g. blanching, tingling, numbness?				
8.4	Do the notes record family history?				
8.5	Do the notes record past medical history?				
8.6	Do the notes refer to daily vibration exposure?				
8.7	Do the notes record medication history?				
8.8	Do the notes record social history e.g. smoking?				
8.9	Do the notes record work history?				
8.10	Has the subject had the appropriate examination? E.g. Appearance, Circulation, Nervous system, Musculoskeletal.				
8.11	Has blanching been witnessed, or photographs received or requested?				
8.12	Are consent/confidentiality guidelines followed?				
8.13	Is there a clear impression?				
8.14	Is there a plan in place?				
8.15	Signed and Dated				
9	Any other special circumstances? Please give details.				
10	Could you manage this subject with these notes / report for this problem at next review?				

Auditor's Signature:

Date:

APPENDIX B
APPOINTMENT LETTER TEMPLATE

Patient Address

Clinic Address

Date

Dear

1. Find enclosed a questionnaire relating to your previous exposure to vibration. It is essential that you complete this with as much detail as possible and bring it to your appointment.

2. If you are taking regular medication, please bring along a list detailing your current prescriptions.

3. If you experience episodes of whiteness, tingling or numbness in your fingers or hands please use the enclosed hand pictogram form to shade in the affected area on the blank pictures of hands. If you have symptoms at night have this form ready to complete at the time rather than draw from memory in the morning.

4. If you experience episodes of finger whiteness it is very important that you bring along photographs to show the whiteness. A phone camera image is acceptable, and a printed copy would also be helpful. It is preferable that these photographs are taken with your hands alongside your face, one to show the fronts and another to show the backs of the hands.

5. Please ensure you do not work with vibrating tools on the day of the tests. Also, do not drink alcohol for 12 hours, or drink a caffeine containing drink for four hours, or smoke for three hours before testing.

Yours sincerely,

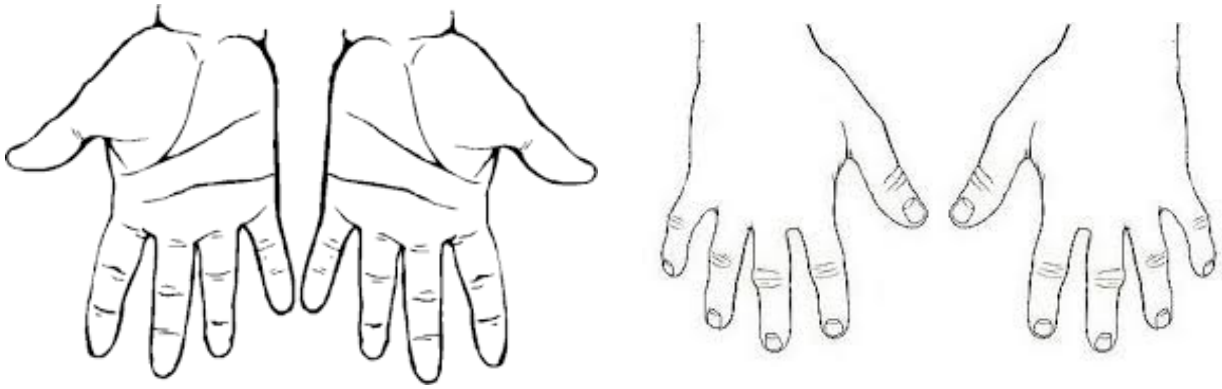
APPENDIX C
HAND PICTOGRAMS

Name	Date of Birth

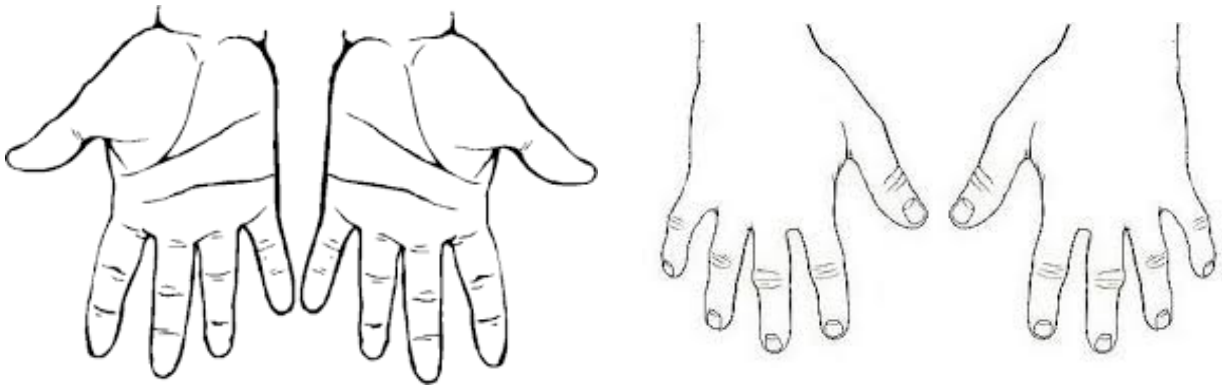
How to complete the pictograms

Shade in the areas on the illustrations below where you experience the relevant symptoms.

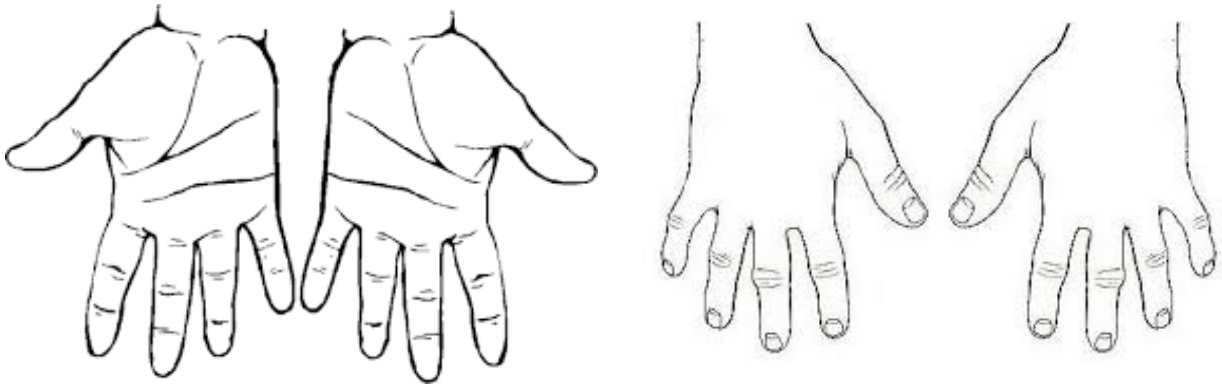
1. *Whiteness*



2. *Tingling / Pins and needles*



3. *Numbness or loss of feeling*



APPENDIX D
THE HAVS CONSULTATION CHECKLIST

Dr Minha Rajput-Ray, Dr Roger Cooke (June 2019)

Please note - This section is intended as a checklist/ aide memoire and should be read in conjunction with the other papers in this document

Background information and History Taking

1. Important to obtain as much as possible e.g. previous medical records, reason for consultation ?
2. Take into consideration the complexity of the assessment – is this for health surveillance, a legal opinion or a second opinion ?
3. Be aware of reinforcement of responses to questions regarding symptoms as the employee sees more healthcare professionals and the potential for this to influence the answers provided in the history taking.
4. Check with the employee for the availability of photographs of any colour changes reported, ideally correlating hand to the face to verify identity of the employee.

Exposure

1. HSE Guidance is that copies of risk assessments should be available to occupational health providers (ref: HSE Topic Inspection Pack Hand Arm Vibration Syndrome 2010)
2. In the absence of a copy of the risk assessment, time should be taken to find out as much as possible about the exposure - measured in metres per second, squared over an 8-hour period A(8), or using the HSE points system
   - The generally accepted "no harm level" is 1m/sec^2 (16 points on HSE Scale)
   - Daily exposure action value (EAV) of 2.5m/sec^2 (100 points on HSE Scale) indicates clear risk to the exposed employee requiring health surveillance and other actions by employer (e.g. provision of information, instruction and training).
   - Daily exposure limit value (ELV) at 5m/sec^2 (400 points on HSE scale) represents a high risk above which employees should not be exposed.
3. A site visit would be ideal and would represent best practice and is often worthwhile to see the tools used; alternatively a photograph of the workplace and tools would be a useful guide.
4. Access to the employer Health and Safety paperwork regarding use and whether there is regular maintenance of tools.
5. Use of the HSE Hand Arm Vibration Exposure Calculator
6. Remember to ask about exposure to cold (e.g. cold tool surface, cold air) and wet environments
7. Enquire about the use of protective equipment e.g. gloves. Useful to ask about perception of use of PPE – and whether there is good compliance with use.

The following is a summary chart when asking about types of tools used – which may be divided into four categories - Hand Held, Hand Guided, Hand Fed and others.

Handheld Power Tools	Hand Guided Machinery	Handheld Machinery	Others
• Fettling tools • Needle guns • Pneumatic flanging • Impact wrenches • Nibblers • Riveting tools • Nut runners • Hammer Drills • Jack hammers • Chipping hammers • Rammers • Percussive chisels	• Handheld polishers • Pedestal grinders • Rotary burring tools • Flexi driven grinders and polishers	• Lawn mowers • Chain saws • Brush straws • Barking machines • Strimmers • Hedge trimmers	• Shoe pounding up machines • Motorcycle handlebars

Risk Assessment

1. Risk assessment is a dynamic process.
2. Ask about measures that have been implemented to reduce the vibration and/or cold/wet exposure.
3. This is especially important in cases where there is suspected progression of symptoms.
4. It may be useful to construct a timeline, as this will help guide the risk assessment process.
5. Ask about modification to equipment, purchase of different equipment, overall maintenance of tools, job and/ task rotation
6. Where it has not been possible to control the exposure to vibration and associated factors, enquire about the use of a Health Surveillance Programme

Key points for Vascular changes

As far as possible, ensure open ended questions regarding changes in the initial distribution and current distribution. This is likely to be especially important with reference to the features below and when considering differential diagnoses that may occur in other conditions.

- distribution
- duration
- frequency
- provocative factors (eg cold, posture)
- reversibility – does the subject do anything to alleviate the symptoms (eg flick sign in CTS, change neck posture in cervical spondylosis)

Key points for Sensorineural changes:

As far as possible, ensure open ended questions regarding changes in sensorineural symptoms and reversibility upon cessation of tool use. Tingling for more than 20 minutes after tool use is a useful guide rather than a hard and fast rule for indication of pathological change. Sensory symptoms may be of tingling, numbness, anaesthesia hyperaesthesia or pain. It is important to record the subject's description of the nature of any sensory symptoms as well as

- distribution
- duration
- frequency
- provocative factors (eg cold, posture)
- reversibility – does the subject do anything to alleviate the symptoms (eg flick sign in CTS, change neck posture in cervical spondylosis)

Pay special attention to distribution of symptoms that may point to the pattern below and may also overlap with other upper limb musculoskeletal conditions:

- peripheral neuropathy
- nerve trunk lesion
- central lesion

Functional Ability

1. It is important to take a careful history of activities that require a level of manual dexterity. For example getting dressed (buttons, zips, shoelaces), lawn maintenance, fishing, snow or ice removal, washing the car, doing the dishes.
2. Ask specifically about out of work activities, including other part time work and hobbies.
3. Check if any modifications have been made to tools used at home for leisure pursuits, e.g. bubble wrap on the handle of a garden lawn mower.

General Observations

1. A general overview of how the employee behaves, managing buttons and shoelaces when undressing and dressing. Can they grip the door handle, manage buttons or shoelaces, complete the consent form?
2. An awareness of cooperation and bias (examiner, intra examiner based), being aware of the possibility of employee fatigue

Clinical Testing

1. Use of appropriately calibrated equipment as per good medical practice.
2. Remember to keep an open mind about other neuropathies that can affect the upper limb.
3. Many tests are subjective, and variable results may be obtained by the same examiner and/ or between different examiners - hence important to look at the picture as a whole.
4. It may be helpful to use a washable marker to ask the employee to 'draw on their hands' the area of tingling or numbness or other altered sensation.

Further Management

1. Having reconciled all the background information, history findings and clinical examination, there is likely to be benefit in reflecting on the case as a whole.
2. In cases of doubt, or concern seek opinion of a senior colleague with experience in HAVS. However, it is important to recognise that in HAVS many conclusions are based on subjective assessments, and opinion, and that opinions may differ amongst different clinicians.
3. In the case of HAVS related symptoms, outline a robust plan regarding Tier 5 testing or other further investigation. Ensure clarity as to what additional information this may provide to assist with diagnosis, staging or management?
4. Explain the above to the employee and obtain relevant consent to communicate this to the employer regarding further vibration and associated factor(s) exposure.
5. Advise the employee to report to his/ her supervisor immediately any change in upper limb symptoms.

REFERENCES

- Budd D, Holness DL, House R Occup Med (Lond) 2018 Sep 13; 68(7):476-481 Functional Limitations in workers with hand-arm vibration syndrome (HAVS).

APPENDIX E
SUBJECT/EMPLOYEE INFORMATION LEAFLET

Revised version by Miss Nikla Rai & Professor Jill Belch, 2020

This Information Leaflet is for employees who work with vibrating tools.

Introduction

Hand-arm vibration syndrome (sometimes abbreviated to HAVS) is where excessive vibration exposure causes changes in the small blood vessels, usually of the fingers, and causes them to constrict (vasospasm) on exposure to cold and pressure (eg carrying a shopping bag). This spasm causes the fingers to go white (blanch), sometimes blue, and then, as the spasm is relived, and the blood returns, a red colour can be seen as the blood flow returns (reactive hyperaemia). The blanching can be accompanied by pain, and the redness accompanied by burning or tingling. HAVS is a form of Raynaud's phenomenon, Raynaud's has lots of causes, and excessive vibration exposure is just one of them.

There can also be changes in feeling (sensation) in the fingers. There are two types of sensation problems. The first is associated with the blanching, when numbness occurs, and the sensation returns when the blood flow returns. The second is where the small nerves, usually in the fingers, are damaged by vibration. This means that items held are not felt properly, so clumsiness can be a complaint, or of dropping things. It can cause difficulty with fine movements such as picking up coins and doing up buttons.

Causes of hand-arm vibration

As mentioned above repeated and frequent use of hand-held vibrating tools causes injury to the small nerves and blood vessels in the fingers. The injury is a result of holding the hand-held power tools (such as grinders, sanders, grinders, disc cutters, hammer drills, chipping hammers, chain saws, brush cutters, hedge trimmers, scrabblers, needle guns or road breakers), hand-guided equipment (such as powered lawnmowers or pedestrian controlled floor saws), or by holding materials being worked by hand-fed machines (such as pedestal grinders or forge hammers). Too much exposure to hand-arm vibration can cause Hand Arm Vibration Syndrome (HAVS) and Carpal Tunnel Syndrome. It would be unusual to develop hand-arm vibration syndrome unless vibrating tools had been used for some time.

What is Hand Arm Vibration Syndrome?

- HAVS affects the nerves, blood vessels, muscles and joints of the hand, wrist and arm.
- It can become severely disabling if ignored.
- It includes vibration white finger, which can cause severe pain in the affected fingers.

What is Carpal Tunnel Syndrome?

Carpal tunnel syndrome is a nerve disorder which may involve pain, tingling, numbness and weakness in parts of the hand, and can be caused by, among other things, exposure to vibration.

What are the early signs and symptoms to look out for?

- Tingling and numbness in the fingers (which can cause sleep disturbance).
- Not being able to feel things with your fingers.
- Loss of strength in your hands (you may be less able to pick up or hold heavy objects).
- In the cold and wet, the tips of your fingers going white then red and being painful on recovery (vibration white finger). If you continue to use high vibration tools these symptoms will probably get worse, for example:
- The numbness in your hands could become permanent and you won't be able to feel things at all.
- You will have difficulty picking up small objects such as screws or nails;
- The vibration white finger could happen more frequently and affect more of your fingers.

As above the most frequent symptoms are of blanching, numbness and tingling. The blanching may be mild, just affecting some fingertips at first, but may spread if continued over-exposure to vibration continues. Cold weather, working outside, touching cold objects or cold water can bring on attacks. This is due to blood vessel constriction (spasm).

As above there are two types of sensation problems;

- Loss of feeling (numbness) occurs with the blanching, but this symptom disappears when the vasospasm goes, and blood flow is returned.
- The second form of loss of feeling can be progressive, starting with tingling then progressing to significant changes/ loss of sensation if over-exposure continues. it may become difficult to handle coins, screws, nails, threads, etc. In some cases, one finger is badly affected with other fingers only mildly affected. This second form of sensation problem is related to small nerve damage.

Symptoms may remain mild but if over-exposure to vibration occurs, they can progress. The vasospasm may affect more fingers, become more frequent, occur in warmer months as well as colder months, and the sensation problems may make carrying out daily living tasks difficult. These severe forms are, however, thankfully rare.

What the law says

- Make sure that risks from vibration are controlled
- Be provided with information, instruction and training are provided to you on the risk and the actions being taken to control risk
- Attend health Surveillance appointments
- Your employer has a duty to reduce the risks from vibration to the lowest level reasonably practicable and to reduce exposure to as low as reasonably practicable if it is above EAV (Exposure Action Value). Exposures should not exceed ELV (Exposure Limit Value).

ADVISORY NOTE 1:

1. A daily EAV of 2.5 m/s^2 A(8) represents a clear risk requiring management; and
2. A daily ELV of 5 m/s^2 A(8) represents a high risk above which employees should not be exposed.

How can Employees help reduce the risks?

It is your employer's responsibility to protect their employees against HAVS and carpal tunnel syndrome, but you should help by asking your employer if your job could be done in a different way without using vibrating tools and machines. If this cannot happen:

- Ask to use suitable low-vibration tools.
- Always use the right tool for each job (to do the job more quickly and expose you to less hand-arm vibration).
- Check tools before using them to make sure they have been properly maintained and repaired to avoid increased vibration caused by faults or general wear.
- Make sure cutting tools are kept sharp so that they remain efficient.
- Reduce the amount of time you use a tool in one go, by doing other jobs in between.
- Avoid gripping or forcing a tool or workpiece more than you have to.
- Store tools so that they do not have very cold handles when next used.
- Encourage good blood circulation by:
  - keeping warm and dry (when necessary, wear gloves, a hat, waterproofs and use heating pads if available);
  - giving up or cutting down on smoking because smoking reduces blood flow; and - massaging and exercising your fingers during work breaks.

How to avoid HAVS

- Learn to recognize the early signs and symptoms of HAVS.
- Report any symptoms promptly to your employer or the person who does your health checks.
- Use any control measures your employer has put in place to reduce the risk of HAVS.
- Ask your trade union safety representative or employee representative for advice.
- Discuss any concerns with your employer/occupational health team
- Keep warm at work, especially the hands
- Do not smoke as the chemicals in smoke cause vasospasm
- If your tools are marked with time limits, obey these
- Take regular breaks away from the tools. Short bursts of exposure are better than one long exposure
- Ensure tools are well maintained.

ADVISORY NOTE 2:

Stopping or reducing working with vibrating tools may prevent symptoms from becoming worse if enacted early enough. In general, you can reduce risks of vibration exposure by either reducing the vibration transmitted to your hand or by reducing the time-spent holding vibrating equipment or workpieces.

Management of HAVS in workplaces:

If symptoms occur these should be reported to your employer, who may well already be screening for HAVS every year through a questionnaire. They will refer you for assessment to occupational health. The results will be discussed with you and an action plan devised.

During the assessment other causes for symptoms will be looked at, for example some drugs can cause vasospasm. Non-drug 'treatments' such as wearing gloves, using hand warmers etc can be useful. Also stopping smoking will be encouraged.

HAVS, when mild or moderate, can get better when vibrating machine use is reduced or stopped. Unfortunately, when severe it may persist even when vibration exposure has ceased.

ADVISORY NOTE 3:

In some workplaces there are already information available to show the operating time of equipment so that daily exposure action values are not exceeded. Please ensure you are aware of your Organisation's guidance.

REFERENCES

For more information on hand-arm vibration, see HSE's free leaflet Control the risks from hand-arm vibration INDG175(rev2) and Hand-arm vibration INDG296 (rev 2)and visit HSE's vibration website at www.hse.gov.uk/vibration.

APPENDIX F
REPORT TEMPLATE TIER 3 ASSESSMENT

Dr Roger Cooke, June 2019

1. The following report template is intended for guidance to those undertaking Tier 3 surveillance in accordance with the Control of Vibration at Work Regulations.
2. There are 4 options available as follows, with introduction and conclusion paragraphs, but as each case will vary in presentation, this can only be used as a basis for any report and is intended to assist in ensuring that all relevant issues are reported to the employer. Free text should be added as required to ensure appropriate advice is offered to the employer.

Manager name
Company Name
Company Address

Date

Dear

Re: Employee name

Thank you for asking me to see Mr/Ms _____ which I did today at _____ . This was for the purpose of tier 3 assessment in accordance with the Control of Vibration at Work regulations (2005), which is required to assess whether or not an employee has symptoms compatible with a diagnosis of either hand arm vibration syndrome (HAVS) or carpal tunnel syndrome (CTS). Mr/Ms _____ had previous completed a tier 1 OR tier 2 questionnaire and was referred for tier 3 assessment as a result of issues declared on that.

I note that this was the first tier 3 assessment s/he has undergone OR he last had a tier 3 assessment on _____

I understand that s/he has / has not previously been diagnosed with HAVS/ CTS.

S/he tells me that s/he has not previously been involved in any litigation relating to HAVS or CTS OR he has previously had a common law claim for HAVS/ CTS.

OPTION 1

This tier 3 assessment did not reveal any symptoms compatible with HAVS or CTS. No further health assessment is required at this stage, but further routine health surveillance should be undertaken in accordance with the findings of your vibration risk assessment.

OPTION 2

This tier 3 assessment identified symptoms compatible with HAVS or CTS, and further assessment is required in accordance with the Control of Vibration at Work regulations 2005. I recommend referral to an occupational physician for that. While the outcome of that assessment is awaited, I recommend that Mr/Ms _____ is fit to continue in his/her current role, but that you should ensure any exposure to vibration is reduced to as low as reasonably practicable.

OPTION 3

This tier 3 assessment identified symptoms compatible with HAVS or CTS, and further assessment is required in accordance with the Control of Vibration at Work regulations 2005. I recommend referral to an occupational physician for that. While the outcome of that assessment is awaited, I recommend that Mr/Ms _____ should avoid any further exposure to hand transmitted vibration.

OPTION 4

This tier 3 assessment did not identify symptoms compatible with HAVS or CTS but did identify the presence of another condition that requires further assessment. I recommend referral to an occupational physician for that. Meanwhile, Mr/Ms _____ is fit to continue in his current role, but you should ensure his exposure to vibration is reduced to as low as reasonably practicable in accordance with the Control of Vibration at Work regulations.

It should be noted that tier 3 assessment does not constitute a formal diagnosis.
No obligations arise in respect of reporting under RIDDOR as a result of this assessment.

Mr/Ms _____ has been advised of my opinion, and the reason for the advice offered. I confirm that s/he is aware that I am reporting in these terms, and s/he has consented to release of this report, on the basis that s/he receives a copy at the same time as OR before it is sent to his/her manager OR without receiving a copy him/herself.

Yours sincerely

APPENDIX G
REPORT TEMPLATE TIER 4 ASSESSMENT

Dr Roger Cooke, June 2019

The following report template is intended for guidance to those undertaking Tier 4 surveillance in accordance with the Control of Vibration at Work Regulations.

1. As each case will vary in presentation, severity, work exposure etc, this can only be used as a basis for any report and is intended to assist in ensuring that all relevant issues are reported to the employer. Free text should be added as required to ensure appropriate advice is offered to the employer.
2. There are a number of sections with options available as follows:
    a. The introduction contains options regarding previous surveillance, previous diagnosis and previous litigation.
    b. Section 1 has five options A-E re diagnosis
    c. Optional paragraph 2 refers to RIDDOR reportability
    d. Section 3 gives four options A-D re further exposure
    e. Section 4 – two options re fitness for work
    f. Section 5 – two options re Equality Act
4. The scope of the Equality Act is continually developing, and while it is evident that stage 3sn HAVS is likely to produce significant day-to-day functional impairment, it is less clear whether 2sn or episodes of Raynaud's phenomenon would be regarded as doing so. We are not aware of this having been tested at law.

Manager name

Company Name

Company Address

Date

Dear

Re: Employee name

Thank you for asking me to see Mr/Ms _____ which I did today at _____ . This was for the purpose of tier 4 (physician) assessment in accordance with the Control of Vibration at Work regulations (2005).

I note that this was the first tier 4 assessment s/he has undergone last had a Tier 4 assessment on _____ when it was concluded that s/he had carpal tunnel syndrome CTS / had Hand Arm Vibration Syndrome at stage x / did not have Hand Arm Vibration Syndrome or Carpal Tunnel Syndrome.

S/he tells me that he has not previously been involved in any litigation relating to HAVS or CTS. OR S/he has previously had a successful common law claim for HAVS.

CURRENT AND PREVIOUS EMPLOYMENT

I understand that since (date), Mr/Ms _____ has worked as a (job title), using tools as listed below.

S/he reports no other exposure. OR S/he reports significant exposure to vibration prior to the current employment, as listed below:

Tools used	Date of exposure		Average daily hrs trigger time	Average days per week
	From	To		

S/he describes no significant non-occupational exposure to vibration OR S/he reports non-occupational exposure to vibration as a result of _____

1. DIAGNOSIS

This diagnosis is based upon the symptoms reported by (employee name), and consideration of other information provided, being _____

Clinical examination revealed:

OPTION 1A NOT HAVS

In my opinion s/he does not have Hand Arm Vibration Syndrome (HAVS) or Carpal Tunnel Syndrome (CTS).
S/he remains fit to continue in his/her present role. Further surveillance is recommended in accordance with your risk assessment regarding continuing exposure to hand transmitted vibration.

OPTION 1B - NOT HAVS - ANOTHER CONDITION

In my opinion s/he does not have Hand Arm Vibration Syndrome (HAVS) or Carpal Tunnel Syndrome (CTS), but does have (condition). S/he remains fit to continue in his present role. (Insert advice re: other condition). Further surveillance is recommended in accordance with your risk assessment regarding continuing exposure to hand transmitted vibration.

OPTION 1C – HAVS

S/he now reports symptoms, which, in my opinion, are those of Hand Arm Vibration Syndrome at stage R v sn L v sn. This represents mild / moderate / severe symptoms of this condition. These symptoms were first noticed during the current employment / during previous employment.

OPTION 1D – possible CTS

S/he reports symptoms suggestive of carpal tunnel syndrome (CTS), which is likely to be related to (use of handheld vibratory tools) (and) (ergonomic factors associated with wrist posture). There is (also) (no) evidence that this is related to factors other than work. I have advised him/her that this requires further investigation, and recommended that s/he contact his/her GP, with a copy of this letter. I have also offered him/her advice to improve the symptoms. Until the investigations are complete, s/he is fit to continue his current role OR s/he should avoid the use of handheld vibratory tools OR use of handheld vibratory tools should be reduced so far as is reasonably practicable but, in any case, limited to no more than 2.5 m/sec^2 daily A(8), or 100 points on the HSE scale. I recommend review of the risk assessment of his /her vibration exposure, and of his/her wrist and hand movements in accordance with the Manual Handling regulations.

OPTION 1E – diagnosed CTS

S/he reports symptoms that are diagnostic of carpal tunnel syndrome (CTS), that is likely to be related to (use of handheld vibratory tools) (and) (ergonomic factors associated with wrist posture). There is (also) (no) evidence that this is related to factors other than work. (S/he has had nerve conduction studies confirming the diagnosis). S/he (is fit to continue his current role) (should avoid the use of handheld vibratory tools) (use of handheld vibratory tools should be limited to no more than 2.5 m/sec^2 daily A(8), or 100 points on the HSE scale). I recommend review of the risk assessment of his/her vibration exposure, and of his/her wrist and hand movements in accordance with the Manual Handling regulations.

In my opinion, further clinical assessment is / is not required to confirm this diagnosis / staging.

Other relevant conditions

I note that Mr/Ms _____ has no other relevant medical condition OR also has _____

2. REPORTING OF INJURIES, DISEASES AND DANGEROUS OCCURRENCES REGULATIONS (RIDDOR)

OPTION 2A

As there is no diagnosis of a condition specified within RIDDOR, no action is required in this respect

OPTION 2 B

As this is the first formal diagnosis, and assuming that the exposure criteria are met, the condition is reportable under RIDDOR. I would recommend formal review of your risk assessment of his exposure to hand transmitted vibration.

OPTION 2C

This diagnosis requires reporting under RIDDOR, but the symptoms are not new and do not appear to show significant deterioration. Hence, if the condition was previously reported, no further action is required.

3. RECOMMENDATIONS REGARDING FUTURE EXPOSURE TO VIBRATION

OPTION 3A

Although Mr/Ms _____ (name) is currently symptom free, it remains important that his/her exposure to hand transmitted vibration is reduced so far as is reasonably practicable, in accordance with regulatory requirements

OPTION 3B

In order to minimise the risk of deterioration of symptoms, I recommend that his/her future exposure to hand transmitted vibration should be reduced so far as is reasonably practicable, but in any case, to less than 2.5 m/sec2 daily A(8), which is 100 points on the HSE scale.

OPTION 3C

He reports little continuing exposure. If that is correct, which should be confirmed by formal review of the relevant risk assessment, no further action is required.

OPTION 3D

The severity and nature of his/her symptoms is such that I recommend he cease using handheld vibratory tools forthwith.

4. FITNESS FOR WORK

OPTION 4A

In other respects Mr/Ms _____ remains fit for his current role.

OPTION 4B

Because of the symptoms described Mr/Ms _____ should be considered unfit to continue in his/her present role. S/he is fit for tasks other than (insert recommended limitations)

5. EQUALITY ACT

OPTION 5A

It is my opinion that the symptoms are not likely to cause significant functional impairment in day-to-day activities, and hence that the Equality Act is not likely to apply. You will be aware however that determination of this requires an assessment by the employer based on medical advice.

OPTION 5B

It is my opinion that the sensory symptoms, being at the severe end of the spectrum, are likely to cause significant functional impairment in day-to-day activities. I would therefore recommend that you undertake a formal assessment in respect of the Equality Act, which seems likely to apply.

Mr/Ms _____ has been advised of my opinion, including diagnosis, the clinical staging and the above recommendations. S/he is aware that it is a managerial role to consider their implementation.

I confirm that he is aware that I am reporting in these terms, and s/he has consented to release of this report, on the basis that s/he receives a copy at the same time as OR before it is sent to his/her manager OR without receiving a copy him/herself.

Yours sincerely,

APPENDIX H
DETAILED PROCEDURE FOR CHECKING DYNAMOMETER

To check the posts:

Remove the adjustable handle. Check that each post moves freely in its guide (the plastic section where the posts attach to the main unit). There should be a little bit of movement and the posts should wiggle slightly; they should be loose in their guides, even when you put pressure on the sides of the post.

To check the hydraulics:

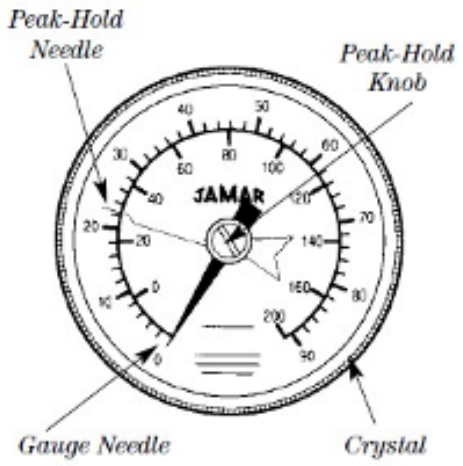
Remove the adjustable handle. Whilst watching the top post, push the bottom post inwards. When you do this, the top post will move in the opposite direction. Then repeat on the other side, i.e., whilst watching the bottom post, push the top post inwards and the bottom post will move in the opposite direction. Normally both posts should travel approximately 1/8 inch (3mm), with top and bottom posts travelling in opposite directions. Travel less than 1/16 inch (1.5mm) means that the device requires servicing as it indicates a leak in the hydraulics system. You can measure this by holding a ruler by the guide whilst pushing on the opposite post and/or by enlisting the help of another researcher.

To check the handle:

Grasp the instrument normally and carefully look at the way the forks of the adjustable handle are supported on the posts. Each fork should touch the post approximately at its mid-point. If not, the instrument should be returned for adjustment.

To check the peak-hold (red) needle:

Turn the peak hold knob (figure 2) counter clockwise and check the peak-hold and gauge needle move without any excessive friction. If the peak-hold needle is not in-line with the gauge needle when it is set back to zero and/or if there feels to be excessive friction when doing so, then you should return the instrument for servicing.



Greasing:

About once a year, place a small amount of grease on the two guides. If excessive friction exists between the post and guide, return the dynamometer for servicing.

If the peak-hold needle is knocked off its support pin, it can readily be repositioned. Unscrew the see-through crystal cover (figure 2) and turn it upside down. Locate the brass pin in the centre of the crystal (part of the chrome knob on the outside of the crystal). Locate the slot on the brass pin and place the peak-hold needle into this slot.

APPENDIX I
EXAMPLES OF HANDHELD VIBRATING TOOLS

Collated by Nikla Rai 2020

Vibrating Wacker Plate

Jack hammer

Drills

Broachers

Floor saws

Rammers

Vibrating rollers

Boring equipment

Masonry cutters

Floor tile remover

Concrete cleaners / needle scalers

Concrete plane

Floor grinders

Floor tile stripper

Metal cutters

Floor polishers

Wood Planes

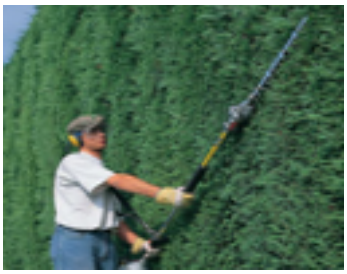
Timber/Chain Saws

Wood Sanding machines

Metal Grinders

Masonry Sanding machines

Air guns



Hedge Cutters and Strimmers

Lawn Mowers

Electric screwdrivers

Electric Impact wrenches

Shot blasters and pressure washers

Riveters

Lab Vortex machines

Shoe making machine

Motorcycle handlebars

APPENDIX J
PEER SUPPORT REQUEST TEMPLATE

Supporting occupational health and wellbeing professionals

Following a series of meetings of the SOM Special Interest Group in HAVS it was decided to offer a system of support for members of the SOM who are undertaking HAVS assessments and require support or advice from a senior colleague with more experience in the subject. We aim to respond to queries within 14 days.

Is your query relating to L140 or other HSE documentation? Yes ☐ No ☐

If no, please state below. If yes, please contact the HSE directly

.....

If your query relates to advice on medical conditions or differential diagnosis, please state below:

.....

If your query relates to equipment for HAVS testing, please state below.

.....

If your query relates to HAVS Assessment process, please tick as relevant and explain below.

1. HAVS 1 ☐
2. HAVS 2 ☐
3. HAVS 3 ☐
4. HAVS 4 ☐
5. HAVS 5 ☐

.....

If your query relates to staging, please state below.

.....

PLEASE SUBMIT THE COMPLETED FORM TO admin@som.org.uk

Supporting occupational health and wellbeing professionals

Charity Commission No: 1184142 • Scottish Charity No: SC049793 • VAT No: 927 0030 57