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Evaluation of proficiency in health surveillance for hand-arm vibration post Faculty of Occupational Medicine accredited training courses

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Research Report

HSE

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Evaluation of proficiency in health surveillance for hand-arm vibration post Faculty of Occupational Medicine accredited training courses

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Health surveillance has long been employed where the risk from hand-arm vibration is significant and is considered a critical part of controlling the risks of the long-term, irreversible health effect Hand-Arm Vibration Syndrome (HAVS). Concerns about the quality of HAVS health surveillance provision and implementation exist.

Together with the establishment of new regulations (Control of Vibration at Work, 2005) and associated guidance (L140) that re-emphasised the importance of health surveillance, training courses with certification from the Faculty of Occupational Medicine (FOM) were introduced. While the responsibilities of doctors and nurses are different, especially in the aspect of doctors' sole responsibility to diagnose and stage HAVS, the courses offer the same syllabus to all attendees. Three main centres established courses to provide this training covering an agreed syllabus: the Health and Safety Laboratory in Buxton; the Institute of Occupational and Environmental Medicine in Birmingham; and the University of Glasgow. Courses commenced in 2005. No formal assessment of the efficacy of this training activity had been considered until the course had been running for some considerable time.

This study aimed to investigate the level of proficiency in HAVS diagnosis and management of affected workers in a cohort of occupational doctors and nurses who had attended FOM training courses.

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KEY MESSAGES

Amongst occupational health professionals, the combination of attending a Faculty of Occupational Medicine (FOM) approved HAVS course and experiential training suggested that:

- While there was reasonable agreement in the identification and staging of the severity of HAVS and almost all differences were within +/- one Stockholm Workshop stage, such differences in staging may have significant implications for subsequent case management.

- Other elements of HAVS health surveillance practices, such as fitness-to-work decisions, frequency of further health surveillance and advice to the employee and employer, seemed largely in line with both HSE guidance and the research team's opinion of appropriate practice.

The nature and timing of this evaluation study (in 2009-2010) means that it cannot be specifically conclusive about the efficacy of all the FOM's approved training courses that have been running since 2005. However, there is limited evidence that attending an FOM course led to immediate and short-term improvements in confidence in performing health surveillance for HAVS.

There is the possibility of cohort bias in this study of 50-100 occupational health professionals from out of well over 1000 occupational health professionals who have successfully attended a FOM-approved training course.

EXECUTIVE SUMMARY

Health surveillance (HS) is designed to fulfil two roles: to reduce the risk of the progression of any identified ill-health in an individual, and to act as part of the overall feedback measures for the employer to ensure that risks are being adequately controlled to prevent new cases of ill-health. Health surveillance has long been employed where the risk from hand-arm vibration is significant and is considered as a critical part of controlling the risks of the long-term, irreversible health effect Hand-Arm Vibration Syndrome (HAVS). However, there have been concerns about the quality of HAVS health surveillance provision and implementation. In conjunction with the establishment of new regulations (Control of Vibration at Work, 2005) and associated guidance (L140) that re-emphasised the importance of health surveillance, it was thought appropriate to institute training courses with certification from the Faculty of Occupational Medicine (FOM). While the responsibilities of doctors and nurses are different, especially in the aspect of doctors' sole responsibility to diagnose and stage HAVS, the courses offer the same syllabus to both doctors and nurses. Three main centres established courses to provide this training covering an agreed syllabus: the Health and Safety Laboratory in Buxton; the Institute of Occupational and Environmental Medicine in Birmingham; and the University of Glasgow. Courses commenced in 2005.

However, no formal assessment of the efficacy of this training activity had been considered until the course had been running for some considerable time. This study aimed to investigate the level of proficiency in HAVS diagnosis and management of affected workers in a cohort of occupational doctors and nurses who had attended FOM training courses, rather than the efficacy of the FOM accredited training courses per se. A questionnaire approach was used in the study. The questionnaire was in two parts, firstly gaining information on the perceived self-confidence of occupational health professionals in performing the various elements of health surveillance for HAV, and then collecting responses to three realistic case scenarios. The study contained a longitudinal element whereby attendees of four training courses held at one site in 2009 were sent a questionnaire prior to attending, again just after attending and then some 3-4 months later. The larger, cross-sectional element of the study involved sending the same questionnaire to all of those who had successfully completed the HAVS training course at three different training centres from the inception of training in 2005 to Autumn 2010.

Forty-seven individuals (15 of them doctors) out of 64 attendees replied to both the questionnaire pre- and immediately post-training course. The results suggested a highly significant improvement in both doctors' and nurses' confidence in identifying HAVS, staging its severity and giving advice to both employees and employers. Unfortunately the response rate at the four-month follow-up (11 replies) limited the conclusions that may be drawn, but confidence levels were still higher in the group at follow-up.

Whilst not analysing the same individuals pre- and post-training, there was evidence that the level of agreement in modified Stockholm Workshop staging on supplied case studies was significantly better in the post-training cohort than the pre-training cohort. However, the level of current and past health surveillance activity in the post-training cohort was significantly greater than the pre-training cohort (i.e. more experienced), and questionnaire responses also suggested that experience was also a significant driver of confidence in staging, not just the effects of the training. Therefore, it is impossible to state that the improvement in staging pre- and post training is wholly related to attending a FOM accredited training course.

The measured overall response rate in the cross-sectional study of those doctors and nurses who were sent questionnaires was 14% (147/1026), based on the numbers of questionnaires mailed out to addresses used for booking training and the completed questionnaires received. However, only 139 responses contained enough data to be able to be analysed. There is evidence from one centre that significant numbers (10%) had moved since their training and had not received the questionnaire.

Results were analysed separately for doctors and nurses. A maximum of 85 doctors and 54 nurses completed at least some of the questionnaire. The data suggested that current and past HAV health surveillance activity was strongly positively influential ($p<0.001$) on how both nurses and doctors felt about carrying out elements of the activity.

In terms of provisional diagnosis of relatively straightforward HAVS case scenarios, the doctors showed over 90% identification of HAVS, with the nurses showing a slightly lower percentage (>80%). For the more complex cases, including the possible co-pathology of Carpal Tunnel Syndrome (CTS) or a non-HAVS condition, the nurses tended to perform worse than the doctors. For the former case, around 95% of doctors suggested a diagnosis of CTS or possible CTS, while for the latter, more rare cases around 50% of the responding doctors suggested the appropriate non-HAVS condition.

The extent of agreement in staging by modified Stockholm Workshop scale was examined for the neurosensory and vascular components of HAVS in both hands of all six case scenarios (five HAVS, one non-HAVS). A formal, unweighted kappa analysis, which does not take into account the extent of disagreements, suggested that there was a fair to substantial agreement (kappa=0.33-0.63) within doctors and nurses analysed separately, with nurses tending to have lower agreement coefficients. This analysis suggested that there was less consensus on stages '2V early' and '2V late' compared to other vascular stages. A similar issue was not apparent concerning '2Sn early' and '2Sn late' within the modified Stockholm Workshop scale. Interestingly, levels of agreement in staging the severity of HAVS were significantly higher in doctors and nurses within the cross-sectional cohort than those in the pre-training questionnaires completed by the longitudinal cohort. However, the former cohort had significantly more experience in HAVS health surveillance that may have influenced the outcome of the effects of the FOM training course.

For doctors, the modified Stockholm Workshop stage of greatest consensus for each of the twelve case-study hands was in agreement with the research team's opinion, but varied between only 47% and 97%. Between 90-100% of the suggested stages were within +/- one stage of their consensus value. Therefore the level of agreement may be practically better than the formal unweighted kappa analysis suggests, but indicates that inconsistencies in uniformity of staging remain that may have significant relevance in terms of case management.

The HAVS case scenarios suggested that 'fitness-to-work with limitations' and 'unfit-to-work' would be applied across presenting HAVS cases; limitations were largely about reducing vibration exposure by unspecified amounts, as low as reasonably practicable (ALARP) or to 2.5 $m.s^{-2}$ A(8). Invariably the suggested frequency of health surveillance was in line with current guidance (annually) or even more frequently (six monthly). The suggested levels of tier 5 or other clinical referral by the doctors depended on the HAVS severity, complexity or apparent confounding pathology, starting at 5% for the lowest severity case to 76-92% where CTS or Thoracic Outlet Syndrome (TOS) were probably involved.

Advice to the employee and the employer were largely in line with guidance or best practice, with some exceptions. For example, notifying the need for RIDDOR reporting across all HAVS severity was highlighted by 83-100% of responding doctors, with no evidence that the lower

stages (e.g. 1Sn or 1V) attracted less support for RIDDOR reporting. Results from a recent questionnaire study among duty holders and health surveillance for HAVS, indicated that passing on individual diagnoses to employers was more common than the supply of grouped anonymised data. This study confirms this, but establishes that obtaining employee consent for passing on individual results is the norm.

Generally those who attended a training course and responded to the study questionnaire showed reasonable proficiency across diagnosing (and differentially diagnosing) HAVS, staging its severity, making fitness-to-work decisions, and giving appropriate advice to both employee and employer. However, there was incomplete agreement in the central task within diagnosis by doctors of staging the severity of HAVS.

CONTENTS PAGE

1. INTRODUCTION

Health surveillance involves putting in place systematic, regular and appropriate procedures to detect early signs of work-related ill health in a workforce. It fulfils two roles: to reduce the risk of the progression of any identified ill-health in an individual; and to act as part of the overall feedback measures for the employer to ensure that risks are being adequately controlled to prevent further, or new cases of, ill-health. Health surveillance has long been employed where the risk from hand-arm vibration is significant and is considered as a critical part of controlling the risks of long-term, irreversible health effects, namely Hand-Arm Vibration Syndrome (HAVS). The establishment of new regulations (Control of Vibration at Work) and guidance (L140) in 2005 re-emphasised the importance of health surveillance in controlling the risk of HAVS [1].

The new guidance in 2005 reiterated the separate roles of doctors and nurses within health surveillance. Diagnosis and staging the severity of HAVS must be performed by a doctor, and is linked to the legal requirement for RIDDOR reporting. Nurses have the role of identifying those workers showing symptoms and ensuring referral for diagnosis. This guidance also detailed a tiered approach to health surveillance to ensure the involvement of appropriate occupational health professionals for all workers under health surveillance. It also introduced a modified Stockholm Workshop scale where stage 2 is split into 'early' and 'late' stages in order to help manage cases.

While health surveillance for HAVS has been well established, concerns have been raised regarding the competence of those carrying out this health surveillance and the quality of services provided. An audit of 12 Occupational Health companies in the West Midlands showed that there were deficiencies in written policies and procedures were often not in place, health surveillance was incomplete and feedback to employers was often inadequate, such that the appropriateness of control measures could not be assessed [2]. A study conducted prior to this, again in the West Midlands, which targeted engineering and utility companies and foundries, also reported issues regarding adequate health surveillance and particularly poor feedback to employers preventing action to control vibration exposure [3]. These studies were conducted at a time when previous HSE guidance for HAV was in place (HS(G)88) [4].

While the HS(G)88 guidance was superseded by new regulations in 2005 and guidance (The Control of Vibration at Work Regulations [1]), it is likely that many of the issues regarding the quality of health surveillance provision identified in these previous studies are still relevant. Importantly, it recommended that doctors and nurses conducting health surveillance for HAVS should have certification from a Faculty of Occupational Medicine (FOM) approved training course in this subject or equivalent competence. Three main centres established courses to provide this training using an agreed syllabus: the Health and Safety Laboratory (HSL) in Buxton; the Institute of Occupational and Environmental Medicine in Birmingham; and the University of Glasgow.

The aim of this training activity was to educate Occupational Health Professionals (OHPs) in the new regulations, how to carry out health surveillance procedures and the management of individuals affected by hand-arm vibration. The hope is that this training will have a real impact upon the competence of OHPs dealing with this health issue, and thereby the quality of health surveillance provided by Occupational Health Service Providers (OHSP). However, no formal investigation into the efficacy of this training activity had been considered until the FOM course had been running for some considerable time. The original aims of the proposed study were to establish both the immediate and longer-term impact of attendance at the HSL FOM

accredited HAVS training course on the ability of OHPs to diagnose HAVS and make appropriate case management decisions. However, a wider outcome of the study is to benchmark the level of proficiency in 2009-2010 of elements of HAVS diagnosis and case management in a cohort of OHPs who had undertaken a FOM accredited training course.

2. IMPLICATIONS

The personal professional capability in specific elements of HAVS health surveillance is largely in-line with both current guidance and accepted best practice. This may suggest that many of the prior concerns expressed about competency in HAVS health surveillance are either a historical problem, relate to relatively few OHPs, or may reflect organisational issues with OHSPs rather than personal competency. However, the incomplete agreement by doctors in staging the severity of HAVS found in this study, and the subsequent possible implications for case management, suggests that further work is necessary in this area. This could involve more expansive training on staging or provision of refresher courses to maintain or improve competence. One potential limitation of this study is the low response rate, and thus it is not possible to say how representative these findings are.

3. METHODOLOGY

3.1 STUDY DESIGN

This was a questionnaire-based study involving doctors and nurses who were, or had, attended an FOM approved course on health surveillance for HAVS. It included both longitudinal and cross-sectional elements. The cross-sectional element involved sending questionnaires to all those who had attended and passed a FOM training course at one of three centres (HSL, Birmingham and Glasgow), from initiation of the courses in 2005 to Autumn 2010 (Autumn 2009 for HSL). Pre-paid return envelopes accompanied the questionnaires. Potential respondents were sent the questionnaire a maximum of two times (if no reply from first mailing) to the addresses supplied at the time of booking their course. The longitudinal element of the study involved contacting attendees from a number of HSL training courses (April, June, September and December 2009) and requesting them to complete a questionnaire prior to attending the course, immediately after attending the course, and again some 3-4 months later.

The questionnaire contained two main sections; one section asked questions concerning their perception of their confidence and the second section contained three HAVS case studies (see below). Initially, in order to diminish recall bias within the longitudinal element, two sets of three case studies were developed (Cases A & B), such that different case studies would be supplied pre-training and post-training. This was also performed in the cross-sectional study such that the questionnaire mailing to individuals randomly included cases A or B.

Due to the nature of the databases maintained on attendees of the course, it was not possible to identify doctors and nurses separately in terms of the numbers sent the questionnaires. However, completed questionnaires identified the specific profession of the respondent. Therefore any response rates can only be calculated in terms of total numbers, not by profession.

Analysis of the questionnaires was undertaken separately for doctors and nurses. We were aware that in asking nurse respondents to complete some of questions, they were being asked to undertake some tasks that are not their responsibility (diagnosis and fitness-for-work decisions). However, both doctors and nurses attend exactly the same FOM HAVS course, on the basis that the more the knowledge of good practice is spread throughout OHPs, the better HAVS health surveillance will be.

3.2 QUESTIONNAIRE

The initial part of the questionnaire contained a series of questions about perceived confidence in diagnosing and managing HAVS cases, and current and past level of HAVS experience. The subsequent section of the questionnaire contained three scenarios of vibration-exposed workers who represented the sort of cases that might be seen during health surveillance for HAVS. The research team, based on their experience of real vibration-exposed workers, had constructed these ‘case’ scenarios. The case scenarios described the age, smoking habits, work setting and vibrational exposure of the ‘case’, as were the signs and symptoms with which the case presented. Two different sets (A & B) of case studies were produced. For each scenario the questionnaire recipient was asked to complete a similar set of questions covering provisional diagnosis, staging, fitness-to-work, frequency of health surveillance, and appropriate advice for both the employee and employer. Some of the questions involved choosing single or multiple answers from a set of possible responses, while others allowed for free text responses.

Five of the six cases involved HAVS, whereas the sixth case was suggestive of a thoracic outlet syndrome (TOS) and one of the HAVS cases was strongly suggestive of carpal tunnel syndrome

(CTS) involvement. The A and B cases (all male) are shown in the appendices. However, in brief the cases were:

Case studies A

1. A mild case of HAVS in a non-smoking worker with 20 years of exposure, with 8 years of symptoms and carrying out a similar job to about 30 other workers.

2. A more serious case of both vascular and neurosensory HAVS in a 48 year old smoker, again with a vibration history of around 20 years. There were few vibration-exposed workers in the firm, but management have been aware from previous HS that he has 'HAVS'.

3. Apparent HAVS in a 58 year old ex-smoking worker with greater neurosensory severity and signs and described symptoms that are strongly suggestive of CTS in the left wrist.

Case studies B

4. Non-smoking 45 year old with 22 years of vibration exposure and working with about 40 co-workers doing the same job. He has had some HAVS symptoms for about 7 years.

5. A 54 year old smoker with roughly equi-serious vascular and neurosensory HAVS and a long history of vibrational exposure.

6. A 44 year old smoker whose symptoms and signs are not suggestive of HAVS, but possibly a TOS, although he has a long history of exposure to vibration.

Within each set of cases, there is a general drift towards more complex cases from the first to the third case.

3.3 LONGITUDINAL STUDY

Those doctors and nurses who were to attend the FOM accredited HAVS training courses held at HSL in April, June, September and December 2009 were sent questionnaires separately from any course material after confirming their booking. Attendees to these courses were also asked to complete the first section of the questionnaire immediately after the course and the full questionnaire four months later.

3.4 CROSS-SECTIONAL STUDY

All attendees who had successfully passed the multiple choice examinations from HAVS training courses at Buxton, Birmingham and Edinburgh were invited to take part in this study. A questionnaire containing one of the two possible sets (A and B) of three 'cases' were sent to each address held from their initial training booking.

3.5 STATISTICAL ANALYSIS

Standard non-parametric statistical analyses were performed, including Wilcoxon matched pair analyses, rank correlation (tau) analysis and inter-rater agreement (kappa analysis). The latter analysis involved an unweighted kappa statistic, as opposed to weighted kappa leading to the calculation of conventional statistical confidence limits, as the number of those staging for each individual case varied. Consequently, kappas were calculated that do not take account of the degree of disagreement. Confidence limits and p-values were obtained from the data using

‘bootstrap’ resampling methods. The bootstrap method involved randomly selecting a sample from the data available and calculating the required statistic – in this case kappa. For this analysis, 500 samples of size 6 were taken, and the distribution for kappa was derived from the 500 calculations of Kappa. Using the distribution generated by the bootstrap sampling, the standard error, confidence interval and p-value for kappa were estimated.

4. RESULTS

4.1 LONGITUDINAL ELEMENT OF THE STUDY

Of the four courses targeted in 2009 with 125 attendees, 62 respondents (15 doctors) completed the questionnaire prior to the course and 50 (14 doctors) completed section 1 of the questionnaire post-training (47 completed both). At the four-month follow-up only 11 returns were obtained (6 doctors and 5 nurses), limiting the power of any longitudinal analysis within the same doctors and nurses.

Changes in pre- and immediately post-training questions about respondents' self-perception of their capability to diagnose, stage and manage HAVS cases were analysed separately for doctors and nurses using the Wilcoxon rank sign test. This was performed to see if there was any evidence that attendance at the courses made any immediate change in self-confidence concerning health surveillance for HAVS.

There were 47 sets of matched-pair data (pre- and immediately post-training course) for comparison about respondents' confidence levels; 15 from doctors and 32 from nurses. For the five questions about the respondents' perception of their confidence to identify HAVS, stage it, make fitness-to-work decisions and give advice to employees and employers, a large majority of respondents declared that they felt more confident in these areas (Table 1) and this was reflected in significantly higher median levels of confidence following training ($p<0.001$).

Figure 1 below shows that the cohort of responding doctors and nurses prior to these training courses reported that they considered themselves to have relatively low levels of both current and past experience in HAVS health surveillance.

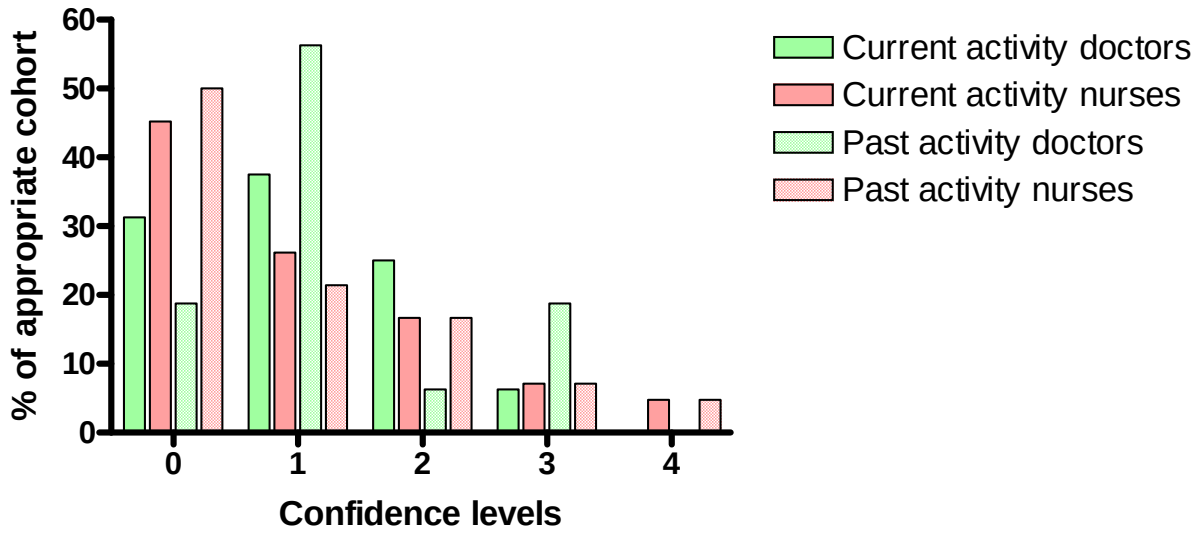

Figure 1 The relative distribution of current and past activity in HAVS health surveillance among those doctors and nurses prior to attending an FOM training course

Table 1 Matched pair comparison of confidence rating at pre- and immediately post-training. Confidence levels scored from 0 to 4 (5 categories) in increasing confidence. Pre- and post-median scores shown, p-value and the number of positive or negative changes in confidence levels in the combined cohort

	Median confidence levels (Wilcoxon test p-values)		Positive changes in confidence	Negative changes in confidence
Question	Doctors	Nurses	Total cohort n=47	
Confidence to identify HAVS (0-4)	Pre=2; Post=3 (p=0.0002)	Pre=1; Post=3 (p<0.0001)	41	0
Confidence in staging HAVS (0-4)	Pre=2; Post=3 (p=0.0005)	Pre=0; post=2 (p<0.0001)	40	0
Confidence in making fitness to work decisions (0-4)	Pre=2; Post=4 (p=0.0005)	Pre=1; post=2 (p<0.0001)	37	2
Confidence in giving advice to a worker (0-4)	Pre=2; post=4 (p=0.0005)	Pre=1; post=3 (p<0.0001)	29	0
Confidence in giving advice to employer about management of HAVS case (0-4)	Pre=2; post=3 (p=0.0001)	Pre=1; post=3 (p<0.0001)	42	0

There were only 11 cases where individuals had returned both the pre-course and follow-up questionnaire at four months post-training. This is a small number to undertake any formal longitudinal statistical analysis, and any conclusions on such a small number of within-subject comparisons must be tempered. However even with this small number, the respondents replied that they felt that their level of current activity in HAVS surveillance at follow-up was significantly greater than prior to the training course (Wilcoxon test p=0.014). Their confidence at four month post-training in identifying, staging and managing HAVS cases also still appeared to be significantly better than prior to training (Table 2). In fact no respondent reported that their level of confidence was lower at follow-up.

Table 2 Matched pair comparison of confidence rating at pre- and four-month follow-up. Nurses and doctors have been combined due to the small numbers

	Median confidence levels (Wilcoxon test p-values)	Positive changes in confidence	Negative changes in confidence
Question	Total cohort =11		
Confidence to identify HAVS (0-4)	Pre=2; follow-up=3 (0.0078)	8	0
Confidence in staging HAVS (0-4)	Pre=1; follow-up=3 (0.0039)	9	0
Confidence in making fitness to work decisions (0-4)	Pre=1; follow-up=3 (0.0078)	8	0
Confidence in giving advice to a worker (0-4)	Pre=1; follow-up=2 (0.0039)	9	0
Confidence in giving advice to employer about management of HAVS case (0-4)	Pre=1; follow-up=3 (0.001)	11	0

4.2 RESPONSE IN CROSS-SECTIONAL STUDY

724 questionnaires were sent out in July 2009 from Buxton, 175 from Birmingham and 127 from Glasgow, both in June 2010. After the second mailing, the numbers of returned questionnaires were 88 to Buxton, 39 to Birmingham and 20 to Glasgow. This reflects response rates of 12%, 22% and 16% from Buxton, Birmingham and Glasgow attendees respectively, and an overall response rate of 14.4%. After appraisal of the returned questionnaires, one return was not from a doctor or nurse and thus was excluded from further analysis. A total of 139 responses contained enough information to be usefully analysed (85 doctors and 54 nurses).

Of the mailings from Buxton 74/724 (10%) were returned to HSL with notification that the addressee had moved from the address given for the training. It is also possible that significantly more questionnaires were not returned as the course participant had subsequently moved. Given that many of the course attendees gave their work addresses, this may suggest both a significant turnover of Occupational Health Professionals and that the actual response rate from those receiving the questionnaire may be better than the 14% quoted above.

Of the 139 returns, 73 subjects (43 doctors; 30 nurses) attempted case studies A and 66 subjects (42 doctors, 24 nurses) case studies B. There was no significant difference between the proportion of doctors and nurses undertaking the A or B case studies (Chi-squared p-value >0.05). However, a small minority of doctors and nurses did not complete all sections of the questionnaire, or all three case studies. This may reflect an element of potential cohort bias in the results in that respondents tended only to complete those case studies where they felt confident about their skills. We have no comparative data concerning non-responders that would identify any obvious cohort bias in terms of how the respondents reflect all occupational physicians and nurses who have undergone FOM-accredited training.

4.3 SELF-PERCEPTION OF CAPABILITY

Respondents had been asked to rate their confidence concerning health surveillance for HAVS. A series of graphs were produced to show the distribution of perceived capability of the responding doctors and nurses in three key aspects of diagnosing and managing HAVS. The distributions were prepared for (a) confidence in identifying and staging cases of HAVS, (b) advising the employer and employee and (c) making fitness to work decisions (see Figure 2). All three aspects show distributions skewed to the right, with the major category reported as 4/5 on the confidence level. The distribution of confidence for doctors and nurses was very similar concerning giving advice to both employees and employers. As possibly expected from their differing roles, notably fewer nurses felt very confident about staging the severity of HAVS. Interestingly both professional groups gave very similar distribution of confidence in making 'fitness for work' decisions, even though this is theoretically the role of the physician.

Both nurses and doctors gave similar flat, non-skewed distributions (Figure 2) for their level of past and current activity with health surveillance for HAVS, indicating a wide spread of activity across the respondents. This distribution appears to be different to those respondents in the longitudinal element of the study (Figure1). Significant correlations between the level of past and present activity were found in this cross-sectional cohort (Tau rank correlation coefficient was 0.694 for doctors and 0.406 for nurses).

Rank correlations (Tau coefficient) between the level of current/past HAVS activity and perceived capability are shown in Table 3 below. All the correlations were significant, confirming that experience may be a key driver of confidence in being able to diagnose and manage HAVS health surveillance, not necessarily simple attendance at a training course. However, training courses and experience are not necessarily independent drivers of increased confidence as attendance at a training course may facilitate gaining greater experience.

Table 3 Rank correlation coefficients (Tau) between levels of activity in health surveillance and self-perceived confidence in elements of HAVS health surveillance

	Current activity	**Past activity**	**Current activity**	**Past activity**
	Doctors		**Nurses**	
Confidence in capability to identify HAVS?	0.352 p<0.0001	0.395 p<0.0001	0.485 p<0.0001	0.500 p<0.0001
Confidence in ability to stage HAVS?	0.509 p<0.0001	0.447 p<0.0001	0.535 p<0.0001	0.304 P=0.0099
Confidence in capability to give advice to workers?	0.404 p<0.0001	0.374 p<0.0001	0.516 p<0.0001	0.417 p<0.0001
Confidence in capability to give advice to employers?	0.446 p<0.0001	0.421 p<0.0001	0.574 p<0.0001	0.440 p<0.0001
Confidence to make fitness to work decisions?	0.377 p<0.0001	0.404 p<0.0001	0.503 p<0.0001	0.417 p<0.0001

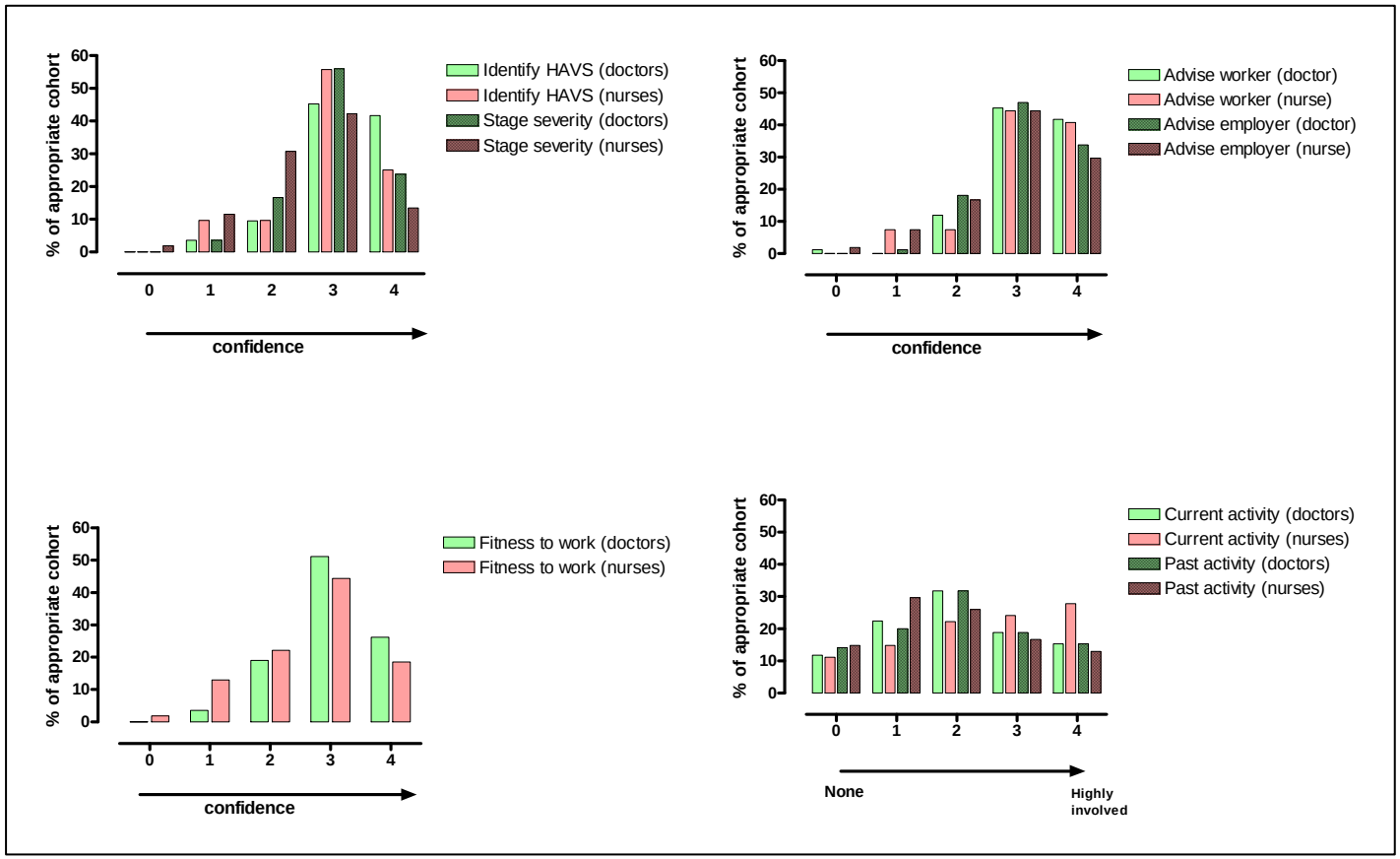

Figure 2 Distribution of responses about confidence in identifying, staging, making fitness-to-work decisions, advising employees and employers, together with their current and past level of HAVS health surveillance activity

4.4 PROVISIONAL DIAGNOSIS AND AGREEMENT IN STAGING

The doctors' and nurses' provisional diagnoses for the three case scenarios within their questionnaire are shown in Figures 3 and 4. Free-text provisional diagnoses have been brigaded into a number of alternatives, some of which are mutually exclusive (e.g. vascular HAVS and primary Raynauds or other primary vascular disease) and some of which are not mutually exclusive (e.g. HAVS and CTS).

Cases 1-5, which had been constructed as HAVS cases, were recognised by more than 75% of doctors as a definite HAVS diagnosis; for those more simply constructed HAVS cases (1, 2, 4, & 5) the doctors' recognition of HAVS was greater than 90% (Figure 3). For case 3 where the case had been constructed by the study team to include CTS, approximately 95% of the responding doctors suggested either 'CTS' or 'possible CTS'. It is appropriate to put these two diagnoses together as 'possible CTS' as they may reflect either the respondent's uncertainty about the diagnosis of CTS or their confidence in provisional diagnosis but understanding that further investigation is necessary to get a formal CTS diagnosis. Case 6 showed a strong provisional diagnostic view amongst the doctors that HAVS was not involved, with around 30% indicating some involvement of CTS, while around 50% of the respondents suggested Thoracic Outlet Syndrome (TOS) or possible TOS (again a response of 'possible TOS' may reflect the need for further investigation to confirm that diagnosis).

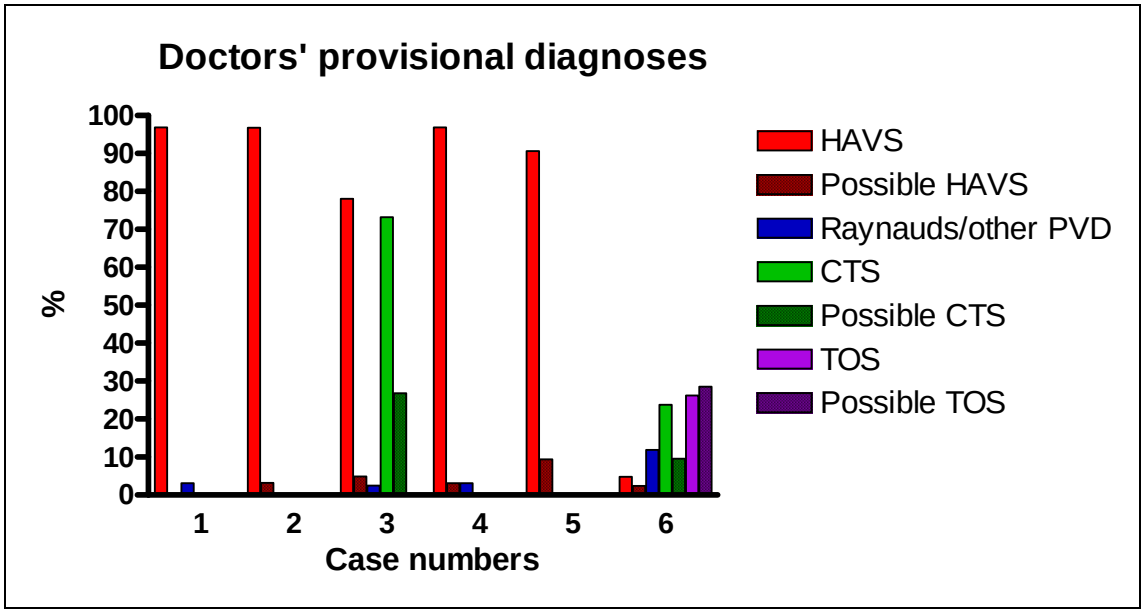

Figure 3 Doctors' provisional diagnosis of the six possible health surveillance case scenarios

A similar analysis was carried out on the nurses' provisional diagnoses. Again, in the straightforward HAVS cases (cases 1, 2, 4 & 5) the nurses had over 80% definite recognition of HAVS, with smaller percentages reporting 'possible HAVS'. The potentially more complex cases (cases 3 & 6) showed differences with the doctors' responses. Only 50% of nurses reported 'CTS' or 'possible CTS' for case 3 compared to over 90% for doctors. No nurses identified TOS, possible TOS, or similar conditions in case 6. Almost 50% of nurses suggested HAVS or possible HAVS for this case, while over 95% of the doctors were convinced that it

was not HAVS. This may reflect that nurses should not be carrying out diagnosis and in fact many of the nurses made specific additional comments on their returned questionnaire that provisional/formal and differential diagnoses were undertaken by the occupational physician after referral by themselves. However, this study suggests that in simple cases of HAVS, nurses who had attended the FOM training course were capable of identifying HAVS.

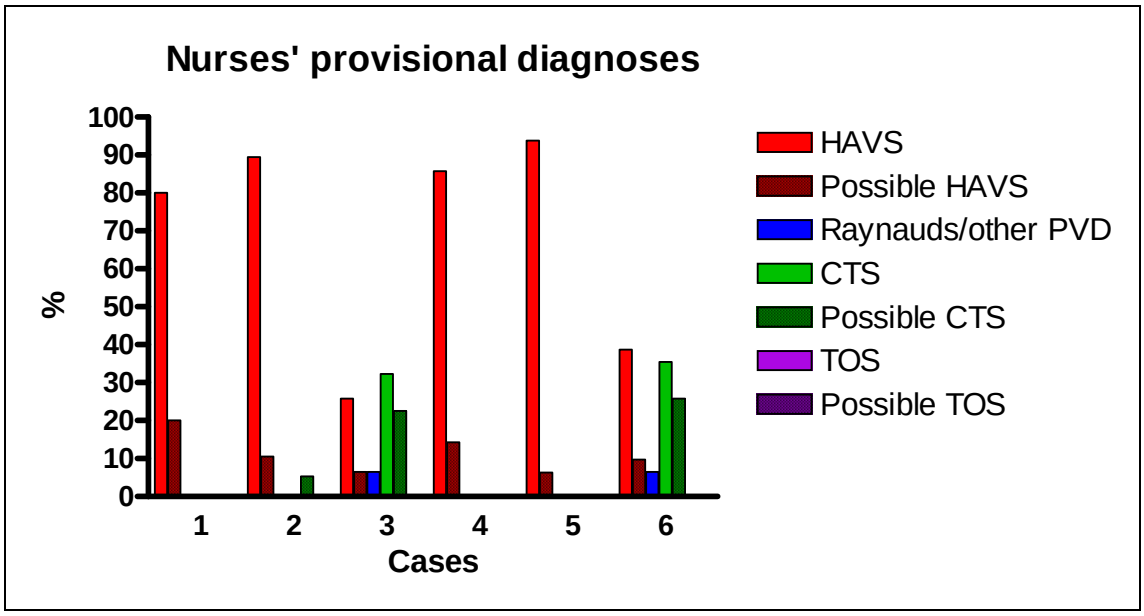

Figure 4 Nurses' provisional diagnosis of the six possible health surveillance case scenarios

The respondents were then asked to stage both for the vascular and neurosensory components of HAVS on the right and left hand of each of the three case scenarios within their questionnaire. Doctors and nurses were offered the modified Stockholm Workshop stages 0V, 1V, 2V early, 2V late, 3V and 4V for the vascular staging and 0Sn, 1Sn, 2Sn early, 2Sn late, 3Sn for neurosensory staging. These are the modified Stockholm Workshop stages as identified in the current HSE guidance [1], and derived from the UK compensation scheme for coal-miners [5-7], and in the light of criticisms [8] about deficiencies of definitions in the original Stockholm Workshop scale [9]. The extent of agreement of staging HAVS within doctors and nurses is shown in Appendix 1. For each case, the vascular and neurosensory stage attracting the highest percentage of agreement within the doctors are shown, as is the agreement with the research team's consensus staging. The percentage of doctors and nurses within +/- 1 stage of their consensus staging are also shown (Appendix 1). There has been very little published data on the extent of agreement in Stockholm Workshop staging between competent occupational health professionals [10]. This limited published data [10], based on only two occupational physicians using the original Stockholm Workshop scale, suggested complete agreement within +/- one stage. This current study showed comparable very high levels of agreement to within +/- one stage for the HAVS cases (cases 1-5) (Appendix 1). However, even a one stage difference, particularly at the high Stockholm Workshop stages, can imply significant differences to case management.

In all cases for doctors, their highest consensus stages (i.e. stage of highest agreement within doctors) agreed with the study team's opinion of staging. Except for vascular staging on one hand, and the neurosensory staging on both hands of case 6 (non-HAVS case), the nurses'

stages of highest consensus also agreed with the study team's opinion. There was also some evidence of 'upstaging' of the sensorineural component in case 1, i.e. a minority of respondents suggested 1Sn where the study team's opinion was 0Sn. This may reflect the relatively common practice of ascribing 1Sn due to symptoms of numbness and tingling associated with the presentation of a blanching attack and subsequent rewarming. In the research team's opinion this is incorrect; neurosensory symptoms of tingling and numbness associated with blanching should be disregarded in the context of applying a sensorineural stage.

Further analyses were also carried out using a formal kappa analysis to look for inter-rater agreement (within doctors and nurses separately). The data from the A and B case series were combined for the purpose of this analysis and the two hands from an individual case were considered as independent.

Table 4 overall Kappa coefficient for agreement in staging according to the modified Stockholm Workshop Scale in doctors and nurses post training, and a confidence interval calculated from boot-strapping

	Number of raters	Overall kappa	95th Confidence interval
Doctors neurosensory staging	33-41	0.50	0.32-0.68
Doctors vascular staging	33-41	0.63	0.41-0.85
Nurses neurosensory staging	20-29	0.33	0.22-0.44
Nurses vascular staging	20-30	0.44	0.25-0.63

The interpretation of kappa coefficients is usually given as:
below 0.0 Poor
0.00 – 0.20 Slight
0.21 – 0.40 Fair
0.41 – 0.60 Moderate
0.61 – 0.80 Substantial

While the nurses had lower mean kappa for both components of HAVS compared to doctors, and mean vascular kappa was higher than mean neurosensory kappa in both doctors and nurses, these differences just failed to reach statistical significance (see 95th confidence intervals, Table 4). However, the mean agreements appeared to be 'moderate' with one 'substantial' and one 'fair' agreement. Doctors' agreements fell within the 'moderate to just substantial' range.

This kappa analysis also allows for investigation as to whether there was more agreement between the doctors and nurses for certain staging categories than others (Tables 5 and 6). The low kappa values for stage 4V are not unexpected. This represents a stage where trophic changes to the fingertips are noted and there is debate as to whether this vascular HAVS stage exists or reflects co-pathology of a systemic sclerotic condition [11-13]. Interestingly, for both doctors and nurses, agreement was less for 2V early and late as compared to 0V, 1V and 3V. This may indicate the differences between 2V early and late in the modified vascular Stockholm Workshop Scale are not well discriminated or generally understood in either doctors or nurses.
Relatively low kappas for 1Sn may reflect differences in neuorsensory staging for vascular blanching, the 'upstaging' of an 0Sn to 1Sn in response to symptoms during blanching attacks described earlier. In fact, the study team did not have a consensus of 1Sn in any of the hands of the six case scenarios, but case 1 which the study team defined as vascular with no neurosensory HAVS component may be subject to such neurosensory 'upstaging'.

The kappa analysis was rerun after removal of the non-HAVS case (case 6) to investigate whether this specific case influenced the overall kappa statistics post-training for HAVS Stockholm Workshop staging. This analysis only made marginal differences to the overall kappa coefficients shown in Table 4.

Table 5 Kappa coefficients for individual vascular modified Stockholm Workshop stages

Outcome: vascular staging	Kappa Nurses	Kappa Doctors
0V	0.75	0.85
1V	0.56	0.67
2V early	0.10	0.15
2V late	0.11	0.25
3V	0.58	0.80
4V	0.02	-0.004
Combined Kappa	0.44	0.63

Table 6 Kappa coefficients for individual neurosensory modified Stockholm Workshop stages

Outcome: neurosensory staging	Kappa Nurses	Kappa Doctors
0Sn	0.21	0.41
1Sn	0.25	0.17
2Sn early	0.25	0.44
2Sn late	0.18	0.46
3Sn	0.58	0.79
Combined Kappa	0.33	0.50

A further kappa analysis was performed comparing the agreement from those doctors and nurses who staged the cases prior to attending the FOM course at HSL (i.e. within the longitudinal element of the study) and those who staged the cases after the course. It must be stressed that these are not the same individuals staging case scenarios pre- and post-training course, but data is compared from the longitudinal and cross-sectional elements of this study. The results are shown in Table 7. These data suggest that agreement in staging was significantly higher post-FOM training than pre-training. However, comparison of the current and past level of activity in HAVS health surveillance showed that those doctors and nurses undertaking the staging exercises after the FOM training had significantly more experience in HAVS health surveillance than those undertaking the staging exercise pre-training (Mann-Whitney tests; $p<0.0001$). Therefore, care must be taken in ascribing this better agreement in Stockholm Workshop staging as wholly due to attendance at an FOM training course, but may also reflect the wider HAVS experience in the cohort gained after attending a training course.

Table 7 Comparison of overall Kappa and calculated confidence interval for those doctors and nurses who staged cases prior to attended the FOM training and those post the training

	Kappa overall Mean (95th C.I.)	**Number of raters**	**Kappa overall Mean (95th C.I.)**	**Number of raters**
	Pre-training		**Post-training**	
Nurses				
Vascular staging	0.107 (0.002-0.211)	14-21	0.441 (0.25-0.63)	20-30
Neurosensory staging	0.216 (0.1-0.331)	14-21	0.331 (0.221-0.441)	20-29
Doctors				
Vascular staging	0.265 (0.059-0.471)	5-10	0.629 (0.406-0.852)	33-41
Neurosensory staging	0.205 (0.067-0.332)	5-10	0.498 (0.321-0.676)	33-41

4.5 FITNESS FOR WORK, REFERRAL AND FREQUENCY OF HS

Table 8 shows the results from fitness to work, referral and frequency of health surveillance questions not requiring free text responses. Formal fitness-to-work decisions are within the role of the Occupational Physician. Many of the nurses highlighted this, although they did undertake the exercises. However, the general pattern of decisions was similar between doctors and nurses.

Table 8 Results of questions on fitness to work, referral and frequency of health surveillance. Percentages were calculated from the numbers initially staging each case, as respondents did not complete all questions, percentages may not total 100%

	Case studies A			Case studies B		
Case number	1	2	3	4	5	6
Research team's consensus staging	1V0Sn Right 1V0Sn Left	3V3Sn Right 3V2Sn late Left	1V3Sn Right 1V3Sn Left with CTS	1V 2Snearly Right 1V2Snearly Left	3V3Sn Right 2Vearly3Sn Left	Uncertain or TOS
Fit to work with vibrating tools?	15% (D) 37% (N)	5%(D) 0% (N)	3%(D) 0% (N)	22% (D) 21% (N)	0% (D) 0% (N)	20% (D) 13% (N)
Unfit to work with vibrating tools?	8%(D) 7% (N)	87%(D) 100% (N)	82%(D) 63% (N)	7% (D) 0% (N)	98% (D) 92% (N)	12% (D) 17% (N)
Fit with limitations?	78%(D) 53% (N)	8%(D) 0% (N)	15%(D) 32% (N)	68% (D) 80% (N)	2% (D) 8% (N)	59% (D) 63% (N)
Consider referring for tier 5?	5%(D) 23% (N)	69% (D) 61% (N)	56% (D) 66% (N)	10% (D) 21% (N)	66% (D) 75% (N)	10% (D) 33% (N)
Consider other specialist referral?	5%(D) 20% (N)	44%(D) 73% (N)	92% (D) 83% (N)	12% (D) 38% (N)	32% (D) 75% (N)	76% (D) 71% (N)
Annual HS?	60% (D) 60% (N)	28% (D) 3% (N)	28% (D) 13% (N)	51% (D) 42% (N)	22% (D) 21% (N)	39% (D) 38% (N)
6-monthly HS?	40% (D) 37% (N)	46% (D) 60% (N)	33% (D) 50% (N)	44% (D) 50% (N)	29% (D) 33% (N)	34% (D) 46% (N)
2 yearly HS?	0% (D& N)	0% (D&N)	0% (D&N)	0% (D&N)	2% (D) 0% (N)	2% (D) 0% (N)
Other frequency	5% (D) 0% (N)	8% (D) 17% (N)	18% (D) 7% (N)	10% (D) 0% (N)	15% (D) 8% (N)	15% (D) 0% (N)

N= Nurses

D= Doctors

It was evident that even for the lowest grade HAVS (case 1), the majority of responding doctors opted for fit-to-work, but with limitations. In two other cases (cases 4 & 6) the majority of both

doctors and nurses also returned a fit with limitations. Appendix 2 diagrammatically shows the suggested range of limitations to exposure given by the doctors. For case 6, which appeared not to be HAVS according to the consensus of doctors' opinion, a large majority of the vibration exposure limitations were accompanied by statements that such limitations were prior to the outcome of further clinical investigation. Around 30% of the limitation statements about case 6 also suggested reduction of, or removal from, above shoulder work activity. Ignoring the atypical case 6, suggestions of reducing vibration exposure to as low as reasonably practicable (ALARP), below 2.5 $m.s^{-2}$ (A8) and by an undefined extent were roughly of the same prevalence.

In terms of referral for tier 5 assessment, the results would largely seem to be in line with HSE's view that for simples cases, or less severe cases of HAVS, further referral for tier 5 is unnecessary. For case 1 with the lowest apparent severity, and only related to vascular HAVS, the suggestion of tier 5 referral was only 5% in doctors, although higher in the nurses. Higher levels of tier 5 referral were found where the more serious HAVS severity was found, but not in case 6, which most doctors had recognised as not HAVS. For doctors, the highest prevalences of considering further clinical assessment were appropriately in case 3 where CTS appeared to be a co-morbidity and the non-HAVS case 6 where the symptoms could be confused with HAVS.

The suggested frequency of health surveillance for these six case scenarios by doctors was largely split between annual and six-monthly intervals. Smaller percentages were for 'other frequencies' and most comments about this suggested that the future health surveillance frequency would depend on the outcome of the further investigations. There was little evidence of any health surveillance being suggested at longer than the yearly intervals suggested in the current HSE guidance [1].

4.6 ADVICE TO THE EMPLOYEE

A high proportion of the doctors and nurses reported that they would explain to the 'employee' about the nature of their symptoms in relation to HAVS (Appendix 3). Interestingly, amongst the doctors the lowest prevalences were found for case 3 and especially case 6, where co-pathologies or confounding pathologies were identified. Those suggesting that they would not explain (the nature of their symptoms) to the employee were significantly related ($p<0.01$) to the need for a further clinical assessment of the employee, suggesting that not explaining their symptoms in relation to HAVS was driven by the need for getting a better diagnosis prior to engaging the employee.

There was a high level of agreement that the occupational health professional would advise HAVS cases about reducing or obviating their non-occupational exposure to vibration. Again, this percentage decreased for case 6 where doctors had largely identified that the symptoms were in likelihood not HAVS and thus not necessarily vibration-related.

For the HAVS cases there was a high level of agreement (90% and more) that the occupational health professional would get specific agreement from the employee to report their diagnosis to the employer. A recent study of HAVS health surveillance provision from a duty holder's perspective had identified that individual diagnoses were being passed to employers rather than anonymised grouped data, but that study did not allow for confirmation as to whether permission had been sought from the employee by the occupational health professional [14]. This present study confirms that permission from the employee seems to be sought as standard practice amongst health professionals undertaking health surveillance.

In terms of 'any other advice' the doctors would give, the three comments with highest occurrence across the six cases were (a) general HAVS advice about smoking, (b) keeping both hands and body warm in terms of blanching attacks, and (c) more specialised advice to the employee that a specialised referral (tier 5 or clinical referral) is necessary in their case (Appendix 4). This latter category may reflect the need to both accurately identify the severity of HAVS staging and co/alternative pathologies that are found in workers using vibrating tools. It can be seen that the significant level of advice about the need for further investigation related to cases 3 and 6. In these cases, CTS and TOS may be involved, which both need specialised investigations to confirm such diagnoses. There was a significant association in responses between advising such employees that they needed further investigation and contacting their GP, indicating the route of referral via the GP for fuller investigation of more complex cases. In many cases the responding doctors stated that they would ask for permission to send a specific letter to the GP, while others suggested that they would give a copy of their report to the employee and urge him to see the GP about making a referral. Two doctors seemed to recommend that all cases involving blanching attacks should try and get photographs of the attacks for both health surveillance and possible medico-legal purposes. The comments made by nurses largely mirrored those of the doctors (Appendix 5).

4.7 ADVICE TO THE EMPLOYER

The prevalence of positive responses in doctors and nurses to specific questions about what they would report to the cases' employers is shown in Appendix 6. Greater than 90% of both doctors and nurses would suggest a review of exposure and control measures in all the cases where HAVS was clearly present. In case 6 (that clearly many of the doctors and some of the nurses did not think presented as HAVS), the percentage appropriately decreased. In all cases where the doctors or nurses would report their diagnosis to the employer, the respondents had reported getting consent from the employee for this course of action. Again, the lower percentage in case 6 for the doctors may reflect the fact that many of the doctors wanted a further clinical investigation in this case before a formal diagnosis could be reached. However, overall the reporting of diagnosis of each individual case was high and in agreement with the high percentage of respondents who would ask the employee for consent to pass their diagnosis onto their employer.

RIDDOR reporting is a legal requirement entailing diagnosis by a doctor. Generally the percentage of doctors who indicated that the employer should be informed about consideration for RIDDOR reporting was high (83%-100%) in those cases involving HAVS (cases 1-5). There was no evidence among the doctors of a reported lower need to report at the initial Stockholm Workshop stages (e.g. 1V or 1Sn). Nurses do not have any necessary involvement in RIDDOR reporting. However, nurses are often the 'face' of health surveillance for employers, and have to field employers' questions about RIDDOR reporting. Nurses generally reported a slightly lower response rate concerning RIDDOR reporting in comparison with doctors, which became significantly lower for the stage 1V scenario.

Generally lower percentages suggested reporting group anonymised feedback data to the employers in comparison with reporting the individual diagnosis. It is interesting that the percentage did not change dramatically between scenarios where anonymity could be easily maintained and those case scenarios where there were few workers such that anonymity could be problematic. These findings are inline with a recent report on health surveillance from the duty holders' perspective [14].

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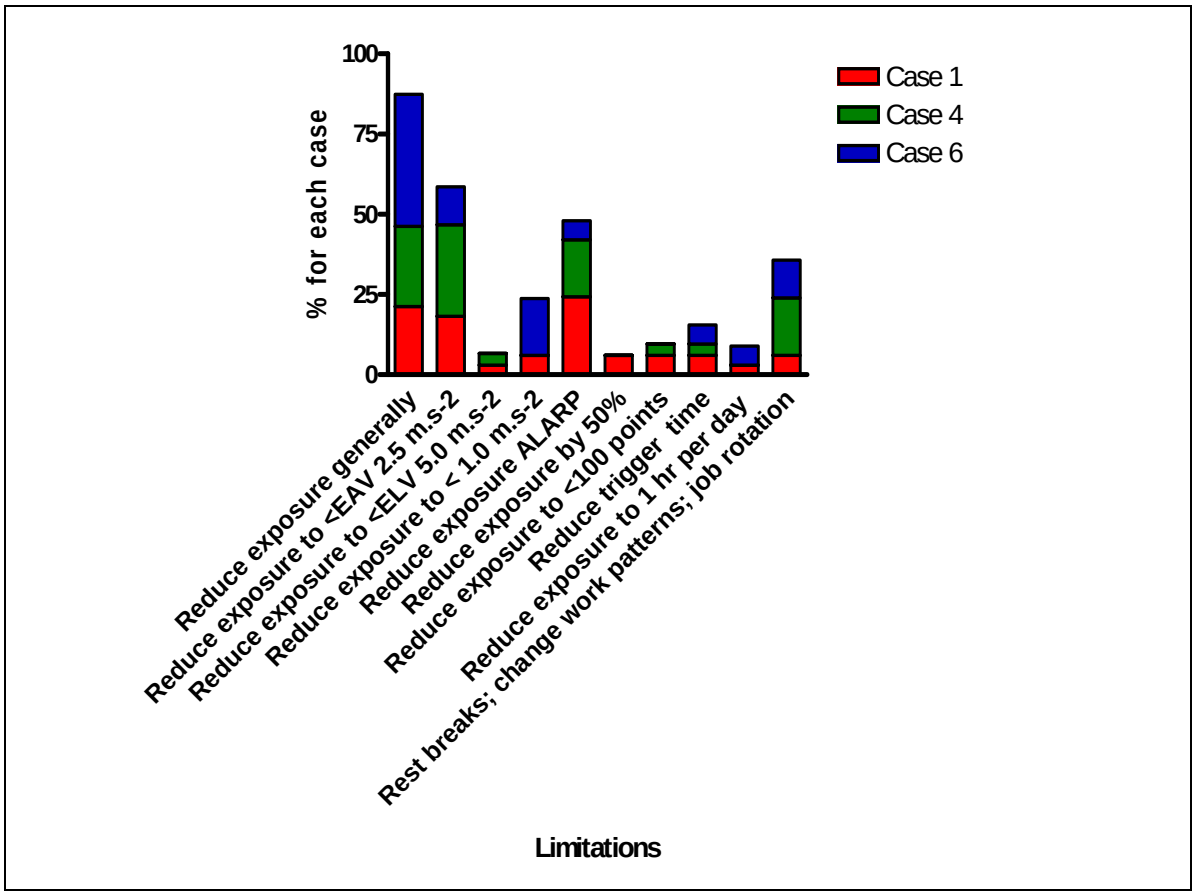
APPENDIX 1 Tabulation of agreement for HAVS staging (right hand & left hand)

	Case studies A			**Case studies B**		
Research team's consensus opinion	1V 0Sn Right 1V 0Sn Left	3V 3Sn Right 3V 2Sn late Left	1V 3SN Right 1V 3Sn Left with CTS	1V 2Sn early Right 1V 2Sn early Left	3V 3Sn Right 2V early 3Sn Left	Uncertain or TOS
Number of doctors staging each case	40	39	36	40	41	33
Highest level of agreement within doctors in staging HAVS	75 & 83% (vascular) 53 & 60% (sensorineural)	85 & 95% (vascular) 79 & 90% (sensorineural)	89 & 91% (vascular) 92 & 94% (sensorineural)	85% (vascular) 68% (sensorineural)	47 & 83% (vascular) 88% (sensorineural)	94 & 97% (vascular) 52% (sensorineural)
Agreement of doctors with research team's opinion of HAVS staging	75 & 83% (vascular) 53 & 60% (sensorineural)	85 & 95% (vascular) 79 & 90% (sensorineural)	89 & 91% (vascular) 92 & 94% (sensorineural)	85% (vascular) 68% (sensorineural)	47 & 83% (vascular) 88% (sensorineural)	94 & 97% (vascular) 52% (sensorineural)
Within +/-1 stage of consensus staging for doctors	100% (vascular) 99% (sensorneural)	90% vascular 97% (sensorineural)	100% vascular 95% (sensorineural)	98% (vascular) 100% (sensorineural)	100% (vascular) 100% (sensorineural)	100% (vascular) 70% (sensorineural)
Number of nurses staging each case	30	30	29	24	24	20
Highest level of agreement within nurses in staging HAVS	77 & 80% vascular 34 & 38% (sensorineural)	73 & 80% (vacular) 62 & 75% (sensorineural)	52% (vascular) 76% (sensorineural)	88% (vascular) 52% (sensorineural)	46 & 71% (vascular) 75% (sensorineural)	85% (vascular) 35 & 45% (sensorineural)
Agreement of nurses with research team's opinion of HAVS staging	77 & 80% vascular 34 & 38% (sensorineural)	73 & 80% (vacular) 62 & 75% (sensorineural)	52% (vascular)76% (sensorineural)	88% (vascular)52% (sensorineural)	42 & 71% (vascular) 75% (sensorineural)	85% (vascular) 25 & 35% (sensorineural)
Within +/-1 stage of consensus staging for nurses	93% (vascular)96% (sensorineural)	100% (vascular)96% (sensorineural)	83% (vascular) 90% (sensorineural)	100% (vascular) 100% (sensorineural	94% (vascular)98% (sensorineural)	90% (vascular) 40 & 60% (sensorineural)

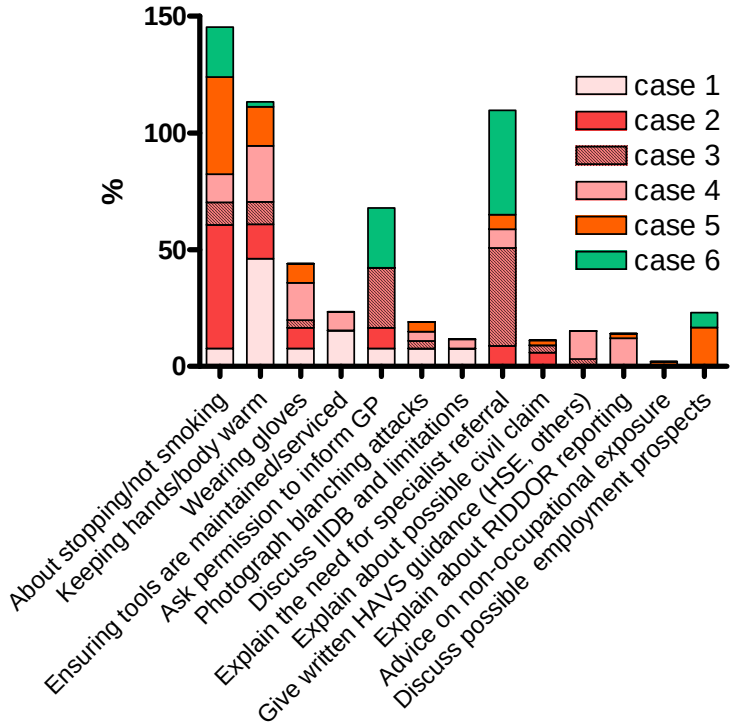
APPENDIX 2 Exposure limitation measures as suggested by doctors for cases 1,4 and 6 where the majority of doctors has opted for a 'fit with limitations' decision. Limitation measures are shown as a percentage of the total suggested for each of the 3 scenarios



APPENDIX 3 Prevalence of specific advice to the employee from the case studies

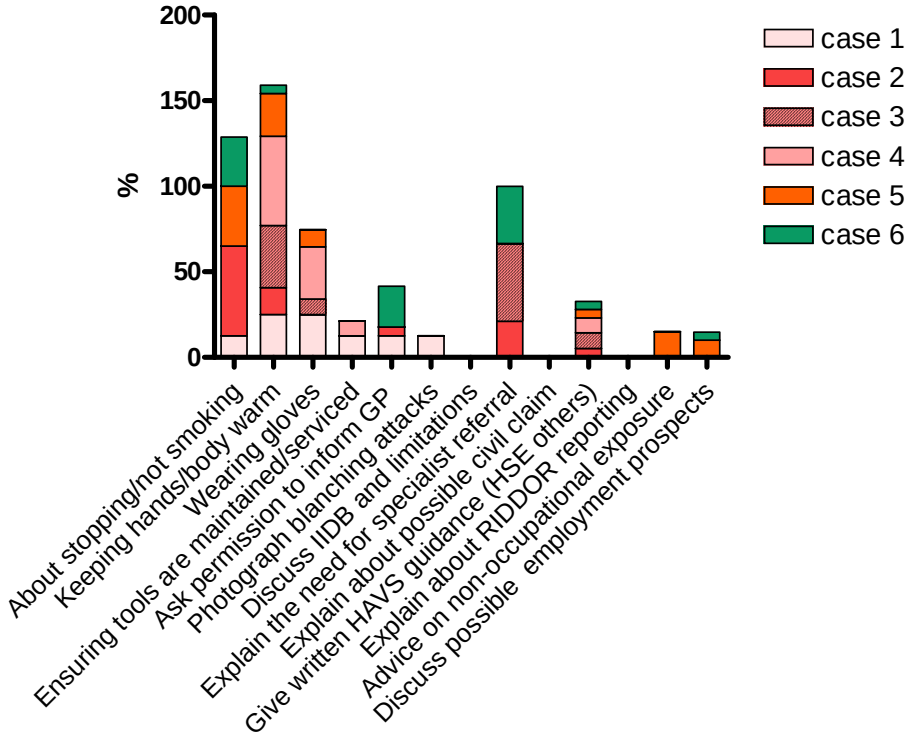
	Case studies A			Case studies B		
	1V 0Sn Right 1V 0Sn Left	3V 3Sn Right 3V 2Sn lateLeft	1V 3Sn Right 1V 3Sn Left with CTS	1V 2Sn early Right 1V 2Sn early Left	3V 3SnRight 2V early 3Sn Left	Uncertain or TOS
Explain symptoms & how to report symptoms?	98% (D) 90% (N)	95% (D) 67% (N)	87% (D) 73% (N)	95% (D) 96% (N)	80% (D) 83% (N)	68% (D) 92% (N)
Advise about reduce/avoid vibration exposure outside work?	85% (D) 73% (N)	97% (D) 97% (N)	92% (D) 87% (N)	90% (D) 92% (N)	90% (D) 96% (N)	49% (D) 80% (N)
Inform worker about applying for prescribed disease IIDB?	35% (D) 17% (N)	85% (D) 67% (N)	59% (D) 53% (N)	49% (D) 21% (N)	93% (D) 63% (N)	7% (D) 17% (N)
Gain consent to inform employer of diagnosis	93% (D) 87% (N)	100% (D) 97% (N)	95% (D) 93% (N)	93% (D) 92% (N)	95% (D) 100% (N)	66% (D) 75% (N)

APPENDIX 4 Breakdown of free-text comments from doctors on 'any other' advice to the theoretical employees reflected by case scenarios 1-6



Any other advice to the worker

APPENDIX 5 Breakdown of free-text comments from nurses on ‘any other’ advice to the theoretical employees reflected by case scenarios 1-6



APPENDIX 6 Prevalence of positive responses to specific questions concerning advice or report to the employer of the case employees

	Case studies (1-3) A			Case studies (4-6) B		
	1V 0Sn Right 1V 0Sn Left	3V 3Sn Right 3V 2Sn lateLeft	1V 3Sn Right 1V 3Sn Leftwith CTS	1V 2Sn early Right 1V 2Sn early Left	3V 3Sn Right 2V early 3Sn Left	Uncertain or TOS
Suggest a review of exposure/control/risk assessment	100% (D) 90% (N)	98% (D) 90% (N)	95% (D) 90% (N)	98% (D) 96% (N)	98% (D) 100%(N)	68% (D) 79% (N)
Report diagnosis to employer	88% (D) 73% (N)	93% (D) 93% (N)	92% (D) 93% (N)	78% (D) 92% (N)	88% (D) 96% (N)	54% (D) 79% (N)
Report case as needing consideration for RIDDOR reporting	88% (D) 40% (N)	97% (D) 83% (N)	87% (D) 77% (N)	83% (D) 79% (N)	100% (D) 92% (N)	27% (D) 42% (N)
Report on the extent of HAVS amongst the workgroup	80% (D) 63% (N)	74% (D) 83% (N)	74% (D) 73% (N)	73% (D) 67% (N)	88% (D) 79% (N)	39% (D) 57% (N)

HSE

Health and Safety Executive

Evaluation of proficiency in health surveillance for hand-arm vibration post Faculty of Occupational Medicine accredited training courses

Health surveillance has long been employed where the risk from hand-arm vibration is significant and is considered a critical part of controlling the risks of the long-term, irreversible health effect Hand-Arm Vibration Syndrome (HAVS). Concerns about the quality of HAVS health surveillance provision and implementation exist.

Together with the establishment of new regulations (Control of Vibration at Work, 2005) and associated guidance (L140) that re-emphasised the importance of health surveillance, training courses with certification from the Faculty of Occupational Medicine (FOM) were introduced. While the responsibilities of doctors and nurses are different, especially in the aspect of doctors' sole responsibility to diagnose and stage HAVS, the courses offer the same syllabus to all attendees. Three main centres established courses to provide this training covering an agreed syllabus: the Health and Safety Laboratory in Buxton; the Institute of Occupational and Environmental Medicine in Birmingham; and the University of Glasgow. Courses commenced in 2005. No formal assessment of the efficacy of this training activity had been considered until the course had been running for some considerable time.

This study aimed to investigate the level of proficiency in HAVS diagnosis and management of affected workers in a cohort of occupational doctors and nurses who had attended FOM training courses.

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