



A review of pre-employment health screening of NHS staff

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Executive summary

In the NHS, successful job applicants are routinely required to undergo pre-employment health screening (PEHS) before their post is confirmed, yet there is poor agreement on why this is done or what it achieves. To address these uncertainties, NHS Plus commissioned a Delphi study on the purpose of PEHS and a systematic review of the evidence for its effectiveness.

In this report, the two studies and their findings, the current situation with PEHS in the NHS in England, and the legislation and national guidance underpinning current activity are described. The economic and ethical issues and the argument for change are also discussed, and recommendations are made for the future.

The Delphi study sought the views of stakeholders on the purpose of PEHS in the NHS. Overall, the highest ranked reasons to undertake the health screening were to:

- identify those who have a physical or mental health condition that is likely to pose a risk to vulnerable patients, themselves or others
- ensure that the applicant meets statutory medical safety standards
- advise the employer or applicant of adjustments or restrictions which may be required
- ensure that the applicant will not be harmed by the duties of the post.

Employers and employees tended to view PEHS more as a management tool, whereas occupational health (OH) professionals viewed it more as a tool to identify individuals who may require adaptations to the workplace.

The systematic literature review looked for research evidence on the effectiveness of questionnaire-based PEHS in assessing fitness to work, prevention of sick absence and identification of individuals who may require adjustments to their work. Little empirical research on these occupational outcomes was found. Researchers either failed to identify pre-employment predictors of health and work outcomes or found very weak predictors. The weak predictors are unlikely to be of practical use as tools at the pre-employment stage of recruitment.

The Delphi study and systematic review demonstrated that while stakeholders have views on the purpose of PEHS, there is no evidence that screening can achieve the outcomes prioritised by stakeholders.

PEHS is a time-consuming process for employers and employees and the direct and indirect costs are substantial. A range of national guidance and legislation that addresses PEHS in the UK is available. In recent years the general trend among regulators has been to recommend less PEHS, restricting it to specific groups where its purpose and benefits can be clearly demonstrated. In 2009 the Department of Health, in its response to the Boorman review of NHS health and well-being,¹ stated that 'Pre-employment health screening should be reduced to essential cases only, and undertaken through online questionnaires where possible, to reduce the burden on occupational health staff'. The Equality Act 2010 outlaws PEHS *before* a job offer is made, except in a few specific circumstances.²

The paucity of evidence for the effectiveness of PEHS and its high cost, combined with the ethical and legal implications of screening, suggest that the current processes and procedures require revision.

Recommendations

- 1 The national guidance on PEHS within the NHS should be updated. The revised guidance should be sufficiently prescriptive and detailed to ensure consistency in practice between NHS trusts.
- 2 Only jobs where there are clear and explicit health criteria should result in PEHS. The screening should assess only the criteria identified as being essential for the job. The jobs and criteria should be published by the employers in a publicly available document and included in the job description.
- 3 Each NHS employer must state explicitly, in a publicly available document, the purpose of any health screening applied to new or transferring employees, and the practical arrangements they have put in place for such screening.
- 4 All jobs should be risk assessed and specific workplace exposures identified before the position is advertised.
- 5 All health screening processes applied to new employees must comply with current legislation.
- 6 All health screening should take place after confirmation of appointment.
- 7 Infection control processes should comply with relevant national guidance such as *Immunisation against infectious disease*.³
- 8 All new staff should receive an invitation to discuss with the OH department any concerns they may have about their health in relation to the job.
- 9 Where, through direct observation or information derived from references, an appointing manager has a specific concern about the health of the new employee, a detailed referral to OH should be made.

Acronyms and abbreviations

BP	back pain
DDA	Disability Discrimination Act 1995
DH	Department of Health (England)
FOM	Faculty of Occupational Medicine
GP	general practitioner
IHR	Integrated Health Records
LBP	low back pain
MFOM	Member of the Faculty of Occupational Medicine
NNR	number needed to reject
NNT	number needed to treat
OA	occupational asthma
OH	occupational health
OHN	occupational health nurse
OHP	occupational health physician
PEHQ	pre-employment health questionnaire
PEHS	pre-employment health screening
PPV	positive predictive value
SA	sickness absence

Chapter 1 The background

Introduction

In the NHS, successful job applicants are routinely required to undergo pre-employment health screening before their appointment is confirmed. There is, however, poor agreement on why this is done or what it achieves. To address these issues NHS Plus commissioned two studies: a Delphi study on the purpose of PEHS and a systematic literature review of its effectiveness.

In this report the current situation with PEHS in the NHS in England, the legislation and national guidance underpinning current activity, and the findings of the Delphi study and the systematic review are presented. The economic and ethical issues and the argument for change are discussed and recommendations are made for the future.

Scope and techniques

The method of health screening used varies from trust to trust and may include one or more of the following:

- the completion of a health questionnaire by the applicant or by the applicant's general practitioner (GP)
- a request for a medical report from the applicant's GP
- a face-to-face or telephone interview
- a clinical examination by an OH professional.

Frequently such health assessments are undertaken prior to the employee commencing work and therefore the term *pre-employment health screening* is used. The same process can be called a *pre-placement health assessment* when it is carried out before an existing employee changes jobs or duties within the same organisation. For clarity, the term pre-employment health screening (PEHS) will be used throughout the report to cover both terms.

Most NHS trusts use OH specialists to assess the confidential medical information that an individual may provide as part of PEHS. The OH specialist will consider any health problem in the context of the proposed job and make a recommendation. The recommendation may range from 'not fit for work' to 'fit for work with/without caveats', such as adjustments to hours or duties.

Some NHS staff are screened and immunised for certain infectious diseases before, or on, employment. Not all pre-employment infection control practices have a strong evidence base but are dictated by national guidance from the Department of Health (DH),³ the Health Protection Agency and the National Institute for Health and Clinical Excellence. Screening for, and immunisation against, infectious diseases have therefore not been included in this report.

Legislation and guidance

In the UK a range of national guidance and legislation exists that addresses PEHS.^{2,4-6} In recent years the general trend among regulators has been to recommend less PEHS, restricting it to specific groups where its purpose and benefits can be clearly demonstrated. The Equality Act

2010 outlaws PEHS *before* a job offer is made, except in a few specific circumstances.² Implementing this part of the act is unlikely to require much change in the NHS as it is already common practice for PEHS to follow selection of the successful candidate.

In 2002, the DH published *HSC 2002/008: Pre and post employment checks for all persons working in the NHS in England*.⁷ This circular, made mandatory by a direction of the Secretary of State for Health, states that:

Before a NHS body makes an unconditional offer to employ...[the employee] must have a pre-employment health assessment.

In 2005, NHS Employers published *Safer recruitment: a guide for NHS Employers*⁸ which superseded *HSC 2002/008* and stated that:

All NHS staff should have a pre-appointment health assessment which includes a health questionnaire.

The most recent guidance from NHS Employers, issued in March 2008,⁹ set out the current position:

All NHS staff must have a pre-appointment health check, which adheres to equal opportunities legislation and good occupational health practice.

Pre-appointment health checks are carried out to:

- *ensure that prospective staff are physically and psychologically capable of doing the work proposed, taking into account any current or previous illness*
- *identify anyone likely to be at excess risk of developing work-related diseases from hazardous agents present in the workplace*
- *ensure, as far as possible, that the prospective employee does not represent a risk to patients and that they will be doing work that is suitable and safe for them.*

The checks should include:

- *a health questionnaire completed by the applicant when applying for the post*
- *an interview with an occupational health nursing adviser, if the questionnaire answers need clarification*
- *onward referral to an occupational health physician, if this is appropriate.*

All checks must take into account the requirements of the Disability Discrimination Act 1995 (DDA) and reasonable adjustments must be made to ensure that people can work in the NHS regardless of physical impairment or learning disabilities.

Employers must make it clear to prospective employees that appointment to any position is conditional on a satisfactory occupational health check.

In its 2009 response to the Boorman review,¹ the DH stated that:

Pre-employment health screening should be reduced to essential cases only, and undertaken through online questionnaires where possible, to reduce the burden on occupational health staff.

Crucial to the law in this area is the Data Protection Act 1998.⁴ Schedule 1 covers the ‘data protection principles’ with Para 1(3) stating that:

Personal data shall be adequate, relevant and not excessive in relation to the purpose or purposes for which they are processed.

Official guidance on how these principles apply to employment health screening is included in the Information Commissioner's *Employment practices protection code*.¹⁰ Section 4.1.5 of the code, 'Do not collect more information about workers' health than is necessary for the purpose(s) behind its collection', advises a 'Review [of] any health questionnaires to ensure that only information that is really needed is collected'. There is more explicit information about health questionnaires in the code's supplementary guidance¹¹ which states:

Health questionnaires should be designed to ensure they only elicit information that is relevant and necessary. This implies they should be designed by health professionals. It also implies that they should be interpreted by those who are qualified to draw meaningful conclusions from the information supplied.

Key evidence in this area comes from the formal enquiry by the former Disability Rights Commission (the statutory body now part of the Equality and Human Rights Commission) into the barriers faced by disabled people in entering the nursing, social work and teaching professions. According to its final report:¹²

The investigation found that public sector employers of nurses, teachers and social workers routinely use lengthy, over-inclusive and intrusive pre-employment health questionnaires. These are costly, not useful and potentially discriminatory because they focus on a person's diagnosis and not on the requirements of a particular job.

In some countries, such as the Netherlands, pre-employment examinations, including screening by questionnaire only without reason, are already illegal. The Dutch Law on Medical Examinations, which came into force in January 1998, only allows examination as a pre-condition for appointment 'if there are special risks associated with the job applied for'.¹³ Specific detailed guidelines on pre-employment screening have since been produced to support the Dutch statutory requirements.¹³

Another international example is that of the USA, where the Americans with Disabilities Act (ADA) 1990 prohibits pre-employment health enquiries other than to access the recruitment process.¹⁴ Under the ADA, an employer:

shall not conduct a medical examination or make inquiries of a job applicant as to whether such applicant is an individual with a disability or as to the nature or severity of such disability.

Pre-employment enquiries are only lawful if they relate to 'the ability of an applicant to perform job-related functions'.

The Equality Act, which will to come into force in October 2010, outlaws most pre-employment health questions before the conditional job offer.² It follows a similar model to that of the ADA as it states that:

an employer must not ask about the health of a job applicant before offering them work. It will be lawful to ask relevant health questions: if the job is only open to applicants with certain disabilities (where this is allowable under other provisions); in order to establish whether the employer has, or will have, a duty to make reasonable adjustments in connection with a requirement to undergo an assessment or interview; for diversity monitoring; and where positive discrimination is allowed.

The line taken in the Equality Act 2010 follows the principles set out by the Faculty of Occupational Medicine (FOM) in its 2006 ethics guidance:⁶

Health questions asked prior to an offer of employment are likely to be, or at least are likely to be interpreted as being, discriminatory. The objectives of pre-employment health assessment can be met if such questions are not raised until the stage when an offer of employment is being made.

Health screening, even by questionnaire, is both an invasion of privacy and the collection of 'sensitive personal information' as defined in data protection legislation.⁴ The FOM guidance clearly states that asking questions about matters that do not affect the outcome of the assessment process is not justified.⁶

Economic considerations

A formal economic assessment has not been undertaken. It is, however, likely that the direct and indirect cost of PEHS is substantial. Screening is a time-consuming and costly process both for employer and employees. In 2007, the OH unit of one NHS trust in London estimated that when using a detailed, four-page PEHS questionnaire, the process took up 50% of their clerical staff time, 20% of occupational health nurse (OHN) advisor time and 5% of occupational health physician (OHP) time (unpublished data, Royal Free Occupational Health Unit).

An audit of a NHS trust in southwest England over a 12-month period (April 2005 and March 2006) found that 2,973 PEHS were undertaken at a cost of approximately £13,502 but that no potential employee was found unfit for NHS work – 1.5% were passed 'fit with comment' and 98.5% were passed 'fit without comment'.¹⁵

As well as the cost to the OH department, there are costs (both financial and non-financial) to the individual job applicant, the human resource department and the prospective line manager.

Summary of previous work assessing the effectiveness of PEHS

Historically, examination by a doctor was the standard form of PEHS in the NHS and in other industries. However, a landmark study in the 1960s showed that examination was no better at detecting morbidity than a questionnaire.¹⁶ This research led most major employers in the UK to screen by questionnaire, examining only those whose answers raised doubts and where there is a legal requirement. Further attempts to evaluate PEHS have been limited. There are no published, high quality studies comparing use of a pre-employment health questionnaire (PEHQ) alone with the use of a PEHQ plus an interview with an OH professional or a PEHQ versus no assessment at all.

A retrospective study from the 1980s evaluated PEHS in new hospital employees in an inner London health authority.¹⁷ The PEHS was by a PEHQ and an interview with the OHN in cases where there were doubts. This study showed that while 100% of student nurses were screened at pre-employment only 43% of other employees were vetted. Student nurse applicants were more likely to be referred to an OH professional than other employees (45% versus 18%) but, during a six-month period, only one person was rejected on health grounds. The majority of reasons for sickness absence or early retirement in the health authority could not have been predicted by PEHS.

In the late 1980s, a study within another health authority¹⁸ demonstrated that there was still a wide variation in what constitutes a pre-employment health assessment. Assessments varied between administration of a PEHQ as the primary evaluation tool, examining all prospective employees for certain posts, and interviewing and examining all prospective employees. Departments which interviewed/examined all prospective employees tended to have a higher rejection rate than those that operated a selective policy or initially evaluated a PEHQ. Outcomes, such as preventing ill health in individuals or other employees, were not assessed.

In the early 1990s, the DH funded the development of a standardised PEHQ for use in the NHS. It was produced from a critical evaluation of 147 different PEHQs used in the NHS. The final questionnaire was based on the consensus opinion of 60 OH professionals to establish which questions were considered to be essential, useful or not necessary.¹⁹ The questionnaire was not evidence based and has not been subject to further evaluation. It is not known how widely it was adopted within the NHS or whether it remains in use.

In 2006, a systematic review of the main factors that doctors take into account when assessing fitness to work and methods used for this assessment found a large variation in both areas.²⁰ Of the 39 articles identified, 25% did not address the decision-making process at all and another 25% mentioned that the doctor ‘forms an opinion based on clinical judgement’. The remaining 50% made brief statements on the decision-making process. Most were based on the disease diagnosis rather than functional capacity and few applied standardised medical or physical standards.

Mental health disorders

Detection of mental health disorders at pre-employment warrants more detailed discussion as, anecdotally, many healthcare managers are concerned about employing staff with a history of a major psychiatric disorder, believing that such a history represents a risk to patient care.

In the absence of empirical evidence on the effectiveness of screening for psychiatric conditions at pre-employment, expert opinion suggests that screening for common mental health problems is not worthwhile.^{21–23} The positive predictive value (PPV) of PEHS by questionnaire for detecting a mental health problem is very low (the PPV is a measure of the usefulness of a test in classifying people with a disease). In the previously mentioned audit of PEHS undertaken in southwest England (see page 4), no potential employees were considered unfit for the post applied for and, of the 45 who were passed as ‘fit with comments’, 12 (0.4% of the total individuals screened) had a mental health problem.¹⁵

It is not known how many patients are put at risk by healthcare workers with physical or mental health problems, but the Clothier²⁴ and the Shipman reports²⁵ examined the circumstances that arose in two cases in the UK where healthcare workers murdered patients.

In the Clothier report, it was noted that Beverly Allitt, who went on to murder a number of children, did not have a PEHS and, even if she had, it is unlikely that it would have picked up what the report described as ‘a malevolent, deranged, criminal mind’. Moreover, the report refuted any suggestion that Allitt’s criminal activities could easily have been detected.²⁴ The most important variable in predicting the risk of violence in the workplace is a past history of poorly controlled aggression.²⁶

A psychiatrist considered Harold Shipman fit to work as a GP despite a history of pethidine abuse and a previous conviction for dishonestly obtaining controlled drugs. He went on to murder over 200 of his patients.²⁵

These two cases, although extreme, illustrate the importance of managers monitoring the behaviour and health of employees and to engender a culture where genuine concerns about changes in behaviour can be reported, investigated and acted upon as necessary. PEHS is designed to detect health problems in individuals, as opposed to the likelihood of individuals participating in criminal activities.

Current practice

To the best of our knowledge all NHS OH departments undertake some form of PEHS. Most use a questionnaire that lists a variety of medical conditions and symptoms and the individual is asked if they have a history of these and, if so, to provide details.

Some employers in the UK, in both the private and public sector, have ceased PEHS for low-risk staff. Others ask a few generic questions about the presence of health problems that might influence fitness to work or the risk of illness through work.²⁷ The responses are used to facilitate the applicant's ability to work by informing the need for work adaptations or restrictions rather than rejection.²⁸

Summary

Although PEHS is mandatory in the NHS there is little evidence that techniques used are effective in achieving the stated aim. Considerable resources are expended in this process and there is doubt about whether current practice is compliant with data protection legislation.

Although various arguments have been put forward in support of PEHS,^{17,29–33} there is no consensus on its purpose and there have been no systematic reviews of the effectiveness of the procedure. Chapters 2 and 3 of the report present two recent studies designed to address these gaps.

Chapter 2 A Delphi study to establish the views of stakeholder groups on the purpose of pre-employment health screening in NHS organisations

Introduction

The primary objective of the study was to establish the views of stakeholders on the purpose of PEHS in the NHS. It was designed to rate the importance of published reasons for performing the screening, rank them in order of priority and explore the reasons for variations in the priorities between different stakeholder groups.

Full ethical approval for the study was obtained from the Central Office for Research Committees.

Methods

Participants were recruited from four groups of NHS staff that were identified as key stakeholders in the PEHS process – OHPs, OHNs, employer representatives (human resource staff and line managers) and employee representatives. OHPs and OHNs were approached via their respective professional organisations (Association of NHS Occupational Health Nurses, Senior Occupational Physicians Group (Scotland), Association of National Health Occupational Physicians and the Senior OHN Managers' Group). Employer and employee representatives were identified and contacted via email using the nhs.net database. The Scottish Trade Unions Congress also recommended participation in the study to NHS members in its newsletter.

The study used a modified Delphi approach with two rounds of questionnaires. Delphi is a multi-stage iterative process that aims to progressively clarify and expand on issues and to identify areas of agreement and disagreement. The Delphi method has previously been used successfully in OH research^{34,35} and is well suited to this type of study. Its advantages include the ability to canvas opinions from a geographically dispersed group and to ensure anonymity between respondents.

The two rounds of questionnaires in the Delphi study were administered using the online survey package Survey Monkey[®] (Survey Monkey Company, OR, USA). Only fully completed questionnaires were included in the analysis.

The round one questionnaire asked respondents to rate the importance (on a five-point Likert scale from 1 = of little importance to 5 = of most importance) of 23 published reasons for performing PEHS. Qualitative feedback was obtained by open-ended questions about the perceived benefits of performing PEHS and suggestions for improvements to the process.

All quantitative data were exported in Excel format and then transferred to the Statistical Package for Social Scientists (SPSS V10; SPSS Inc, USA) for analysis. SPSS was used to calculate

the mean rating scores for each of the 23 reasons. Mean scores were calculated overall for all respondents and for each of the four respondent subgroups.

A one-way ANOVA test was used to establish if there were any differences in the mean rating scores between the four groups studied. A further analysis using the Bonferroni adjustment for pair-wise multiple comparisons helped to determine the statistical significance of the differences in means.

Qualitative data were sorted by respondent subgroup and anonymised ready for hand analysis looking for emerging (or markedly divergent) themes in the responses.

The results of round one were fed back to respondents in the second round survey. The highest rating reasons and those where there were significant differences between respondent subgroups were listed and respondents were asked to rank these 13 reasons in order of importance from most to least. Feedback quickly identified that many respondents found it difficult to rank all 13 reasons and a decision was made to modify the survey so that only the top five reasons for performing PEHS required ranking in order of importance. Responses were analysed by summing the rank order to produce a score for each reason and therefore an overall ranking order.

In addition, the second round survey asked about views on changes in the PEHS process suggested by respondents in the qualitative questions of round one. A summary of the results of the systematic review of the literature on effectiveness of PEHS of NHS staff as described in chapter 3 was fed back and respondents were asked if these had any effect on their opinions about the process.

Results

Response rates

In the first round of the Delphi study, a total of 309 fully completed questionnaires were included in the analysis. Details of each of the four respondent subgroups and the response rates are shown in table 1.

Table 1. Response rates for round one of the Delphi study.

Subgroup	Number of respondents	Number directly approached	Percentage response (%)	Percent of total study population (%)
OHP	97	280	34.6	31.4
OHN	82	300	27.3	26.5
Employer representative	53	152	34.8*	17.2
Employee representative	77	1,000	7.7*	24.9
Total	309	1,732	17.8*	100.0

*Estimate of response rate based on number of individuals directly approached. OHN = occupational health nurse; OHP = occupational health physician.

The overall response rate in round one was 17.7% and rates ranged from 7.7% to 34.8% for the four groups, with the highest participation from employer representatives and the lowest from employee representatives. Contact details were provided by 227 respondents in round one. All 227 were subsequently emailed and asked to complete the second round survey and 145 did so (response rate 63.9%). However, the numbers of employer and employee representatives completing the second survey were lower than the OHP and OHN groups (see table 2).

Table 2. Response rates for round two of the Delphi study.

Subgroup	Number of respondents	Percent of total study population (%)
OHP	61	42.1
OHN	56	38.6
Employer representative	15	10.3
Employee representative	13	9.0
Total	145	100.0

OHN = occupational health nurse; OHP = occupational health physician.

Round one Delphi: rating of reasons

The mean ratings scores (out of five) for each of the 23 reasons for performing PEHS were calculated overall and by respondent subgroup (see table 3).

Table 3. Delphi round one results (mean scores out of five – overall and by subgroup).

Reason for performing assessment	Mean score	Standard deviation	OHP	OHN	Employer rep	Employee rep
Advise on adjustments or restrictions (under DDA)	4.33	0.754	4.37	4.43	4.45	4.10
Identify physical or mental health condition likely to pose risk for patients	4.29	0.714	4.20	4.37	4.42	4.24
Ensure applicant will not be harmed by duties	4.13	0.796	3.96	4.27	4.18	4.16
Ensure applicant is able to carry out duties	4.09	1.056	3.71	3.95	4.46	4.47
Identify physical or mental health condition likely to pose risk to themselves	4.08	0.811	4.03	3.99	4.29	4.08
Identify physical or mental health condition likely to pose a risk to other employees	4.04	0.840	3.87	3.91	4.31	4.20

continued

Table 3. Delphi round one results (mean scores out of five – overall and by subgroup) – *continued*

Reason for performing assessment	Mean score	Standard deviation	OHP	OHN	Employer rep	Employee rep
Identify physical or mental health condition likely to pose a risk to the public	4.02	0.988	3.83	4.00	4.24	4.12
Ensure applicant meets statutory medical safety standards	3.94	1.015	3.78	3.99	4.02	4.05
Assess physical fitness for post	3.91	0.902	3.63	3.87	4.24	4.08
Identify those protected by the DDA to advise employer	3.87	1.018	3.57	3.97	4.23	3.90
Minimise the risk of occupational illness	3.83	0.962	3.62	4.07	3.80	3.88
Assess psychological fitness for post	3.83	0.904	3.66	3.83	3.98	3.95
Exclude those medically unfit for the post	3.70	1.126	3.50	3.49	4.10	3.91
Minimise risk of accidents or injuries at work	3.64	1.105	3.26	3.62	3.90	3.95
Advise applicant that they may have a disability (under DDA)	3.58	1.008	3.24	3.66	3.73	3.82
To provide baseline health record for health surveillance	3.43	1.050	3.20	3.71	3.27	3.51
Identify those with disability or ill health that may lead to repeated time off work	3.28	1.062	2.78	3.09	3.92	3.69
To advise applicant of health and safety risks of post	3.27	1.210	2.76	3.41	3.22	3.79
Protect employer where disability or ill health may lead to repeated time off work	3.12	1.180	2.52	2.86	3.87	3.63
Advise applicant of availability of OH services	3.09	1.133	2.70	3.19	3.13	3.46
Act as a baseline record to help repudiate future compensation claims	2.90	1.151	2.33	2.96	3.11	3.41
Provide general health promotion advice	2.29	1.125	1.79	2.05	2.71	2.91
Undertake lifestyle screening	2.18	1.092	1.52	1.85	2.80	2.91

DDA = Disability Discrimination Act; OH = occupational health; OHN = occupational health nurse; OHP = occupational health physician; rep = representative.

Seven of the 23 reasons had an overall mean score of over 4.00, indicating that these were rated as at least very important on the Likert scale. These reasons related mainly to the concept of risk posed by the applicant's health to themselves or others, advising adjustments required under the DDA, and ensuring that the applicant is able to carry out the duties of the post.

The main statistical differences between respondent subgroups as observed by the one-way ANOVA and Bonferroni tests were:

- employer and employee representatives rated performing PEHS to exclude applicants who are medically unfit higher than OHPs and OHNs
- identifying applicants with conditions that could lead to time off work and protecting employers in this circumstance was rated more highly by employer and employee representatives than by OH clinicians
- employer and employee representatives rated ensuring that the applicant will be able to carry out the duties of the post more highly than OHPs
- the employer representative group rated identifying those applicants protected by the DDA highest of all the subgroups
- performing PEHS to provide a baseline health record for health surveillance was rated more highly by OH professionals
- lifestyle screening and health promotion had the lowest ratings of all reasons in all four subgroups, but employer and employee representatives rated them higher than OH professionals.

Round two Delphi: ranking of reasons

The ranking order of reasons for performing PEHS is shown in table 4. There is quite a bit of overlap between the reasons and it should be noted that OHP and OHN form 81% of the respondents in round two.

Respondents were asked their views on changes to the PEHS process that had been suggested by respondents in the round one questionnaire (see table 5). Only 36% of respondents agreed that all employees should continue to be screened by PEHS and 47% agreed that PEHS should be confined to certain clinical jobs. Interestingly, 43% agreed that PEHS should not routinely be undertaken for low-risk jobs, but 41% disagreed.

Table 4. Delphi round two results: overall ranking of reasons in order of importance.

1	Identify those who have a physical or mental health condition that is likely to pose a risk to vulnerable patients
2	Ensure that the applicant meets statutory medical safety standards
3	Advise the employer or applicant of adjustments or restrictions which may be required under the DDA
4	Identify those who have a physical or mental health condition that is likely to pose a risk to themselves
5	Ensure that the applicant will not be harmed by the duties of the post
6	Identify those who have a physical or mental health condition that is likely to pose a risk to the public
7	Exclude those who are medically unfit for the post
8	Identify those who have a physical or mental health condition that is likely to pose a risk to other employees
9	Identify those who may be protected by the DDA in order to advise the employer
10	Assess the applicant's physical fitness for the post
11	Ensure that the applicant is able to carry out the duties of the post
12	Identify those who have a long-standing disability or ill health that may lead to repeated time off work
13	Protect the employer where a long-standing disability or ill health may lead to repeated time off work

DDA = Disability Discrimination Act.

Table 5. Proposed changes to the PEHS process.

Proposed change	Strongly agree (%)	Agree (%)	Neither agree nor disagree (%)	Disagree (%)	Strongly disagree (%)
No change to existing process (all prospective NHS employees should continue to be screened as before)	10	26	18	33	13
PEHS should be confined to certain clinical jobs that include risks to the employee and to patients (as directed by Department of Health guidance)	11	36	15	33	5
PEHS should be confined to employees who identify themselves as disabled or requiring adjustments to the job	7	22	15	35	21
PEHS should only be carried out where required by statute	6	14	19	40	21
PEHS should not routinely be undertaken for low-risk jobs	14	29	16	33	8

Qualitative feedback from rounds one and two

A summary of the results of the qualitative feedback are presented below. Comments are divided into two themes, firstly limitations of the current process and secondly suggested changes in the process.

- 1 Limitations of the current process:
 - PEHS generates a large volume of work for very little perceived benefit
 - very few applicants are deemed unfit
 - the process relies on complete honesty by applicants
 - there is no evidence that the process could prevent another case of a healthcare worker harming those in their care.

- 2 Suggested changes in the process:
 - the process and paperwork require simplification
 - standardisation of process across the NHS is needed
 - centralisation of data collection or sharing of data between NHS organisations should be established
 - there is a need for improved communication between OH and management, with clarification of the role of PEHS in the recruitment process
 - more functional or physical testing is needed
 - more detailed recommendations or advice to management following assessments should be available
 - targeting PEHS to certain high-risk jobs is advised
 - targeting PEHS to common causes of sickness absence, eg mental health conditions and musculoskeletal disorders, is recommended.

Discussion

This study has sought to establish the views of OHPs, OHNs, employer representatives and employee representatives on the reasons for performing PEHS in the NHS. This is the first time that key stakeholder groups have been surveyed on this subject and their opinions have been explored by a mixture of qualitative and quantitative research.

There was generally reasonable concurrence among all stakeholder groups that identifying a physical or mental health condition which may pose a risk to the prospective employee or third parties in the work environment was a high priority of PEHS. However, of the 23 published reasons, OHPs and OHNs rated advising adjustments or modifications under the DDA as most important while employer and employee representatives rated advising that the applicant is able to carry out the duties of the post highest. There were some other notable differences in opinion between the OH clinicians and the other two subgroups. Employer and employee representatives rated the employer-focused reasons (identifying those who may have repeated time off work and protecting the employer from future sickness absence) higher than the OHPs and OHNs. Performing PEHS to exclude applicants from work because of health problems was rated higher by employer and employee representatives than by OH professionals. These findings suggest that both view the PEHS process as something that it is of benefit to the employer rather than the employee. All groups considered health promotion and lifestyle screening were the least scoring reasons in all four subgroups.

Interestingly, there was wide variation in the views of stakeholders as to whether the process of PEHS should change. The largest variation was on whether PEHS should continue to be routinely undertaken for low-risk jobs. Opinions were almost equally split between those who agreed that it should no longer be undertaken and those who thought that it should.

The study was limited by the recruitment of participants, particularly in the employer and employee subgroups. However, this would only make a difference to the study findings if stakeholders who held strong views in one direction were more likely to respond than those who did not. The study was NHS focused and the results may not be generalisable to non-clinical employment settings.

Conclusions

This study has established that there are differences in opinion between employers, employees and OH professionals on the purpose of PEHS. Employer and employee representatives tended to view the purpose of PEHS more as a management tool whereas OH professionals tended to view it more as a tool to identify individuals who may require adaptations to the workplace. All stakeholders agreed that PEHS has an important role in assessing if an individual has a medical problem which may pose a risk to themselves or others at work. There were divergent views on the need to change the PEHS process.

The differences in the views of OH clinicians and employer/employee representatives on the reasons for performing the assessments could, in part, be due to the lack of evidence base for undertaking PEHS. There is a need to establish the effectiveness of PEHS in meeting the aims of the process, as derived from the most important reasons identified in this study.

Chapter 3 Is pre-employment health screening of NHS staff effective? A systematic review of the literature

Introduction

The Delphi study established a priority list on the purpose of PEHS in the NHS as determined by employers, employees and OH professionals. These included identifying individuals who may require adaptations to their workplace or whose medical condition may pose a risk to themselves or a third party in the workplace, assessing fitness to work and prevention of sickness absence. In order to establish what evidence there is that PEHS is effective when used within this remit, a systematic literature review of the effectiveness of PEHS in assessing fitness to work, prevention of sick absence and identification of individuals who may require adjustments to their work was undertaken. No previous systematic reviews on the effectiveness of PEHS in assessing fitness to work or sickness absence were identified.

Individual risk factors for the development of many diseases, such as occupational asthma (OA) or dermatitis, have been extensively researched^{36,37} but it is important to recognise that there are differences in screening for predictors of illness or disease at pre-employment compared with other contexts. At pre-employment, individuals may not perceive that their symptoms or medication are relevant to work and may not declare these at PEHS. Furthermore applicants may worry that health information disclosed at PEHS will lead to exclusion from a job and they may attempt to conceal symptoms or previous medical history.²⁸ Therefore in undertaking this review only the outcome of studies where screening was done at pre-employment or pre-placement were assessed.

Review methods

The key questions of the review were:

- Are pre-employment or pre-placement health questions an effective tool for detecting current disability or ill health which may affect the individual's employment or require adjustments to the job?
- Are pre-employment or pre-placement health questions effective in predicting future ill health, sickness absence or ill-health retirement, or detecting individuals who are unusually susceptible to hazards in the workplace?
- Can pre-employment questionnaires select workers whose health prevents them from carrying out their job as safely as others?

Infectious diseases were excluded from the review – screening for immunity to, or presence of, relevant infectious diseases is complex and dictated by national guidance.

Guidelines on systematic literature review methodology developed by the NHS Centre for Reviews and Dissemination, University of York, were followed.³⁸

To select relevant papers an amended PICO format was adopted:

- *Population:* individuals assessed at pre-employment, pre-placement or on employment for temporary or permanent placement.
- *Intervention:* PEHS by health questionnaire only.
- *Outcome measure:* detection of current ill health which may affect employment; detection of conditions for which adjustments to the workplace may be required; prediction of future sickness absence/future work-related ill health/future non-work-related ill health/retirement on ill-health grounds or detection of conditions which may lead to an increased accident rate at work.

Search strategy

Relevant studies were identified using a sensitive search strategy with the search terms: 'pre-employment [tw]', 'pre-placement [tw]' and 'pre-work [tw]'. The following computer databases were searched: Medline, Embase, CINAHL, PSYCHINFO, Cochrane Library, British Library Inside Conferences (1993–September 2009), FOM Database of Member of the FOM (MFOM) dissertations, US National Guideline Clearing House, Institute of Management International Databases, Applied Social Sciences Index and Abstracts.

Finally, the following inclusion criteria were applied to the literature search:

- English language titles and abstracts published from 1985 onwards (prior to 1985 most PEHS was undertaken by physical examination rather than by questionnaire alone)
- PEHS based on screening by questionnaire
- primary research studies and systematic literature reviews.

Study selection

The two systematic reviewers (IM and SW) selected abstracts independently. Duplicates and abstracts not meeting the inclusion criteria were eliminated. Disagreements between the reviewers were resolved by discussion. Full articles of the selected abstracts were assessed independently and those that did not meet the inclusion criteria were excluded. References of retrieved papers were checked for other relevant references which were obtained if the inclusion criteria of the study were met.

Data extraction and quality assessment

IM and SW extracted a standard set of information from each paper. The methodological quality of the studies was assessed and the paper included if the critical appraisal suggested a low risk of bias or confounding (tables 6–8). As before, disagreements were resolved by discussion.

Results

The systematic literature search identified 494 abstracts and nine follow-on papers. These included nine published articles and two MFOM dissertations which were critically appraised. Six papers and two MFOM dissertations were included in the evidence tables. One MFOM

dissertation was published as a paper,¹⁵ but as the original dissertation contains more information than the subsequent paper, the MFOM dissertation has been referenced in the evidence tables.³⁹

The included studies grouped naturally into pre-employment predictors of health outcomes (asthma/respiratory symptoms and back pain (BP)) and employment outcomes (work restrictions, sickness absence and ill-health retirement). No papers addressing mental health outcomes were found.

Asthma

Two prospective cohort studies examined if either respiratory symptoms or a history of asthma, declared on the PEHQ, were predictive of work-related symptoms in individuals exposed to irritants or sensitisers at work. In those exposed to grain dust, the only significant determinant of cough at work, after adjusting for confounders, was a history of wheeze. However, the PPV of a history of wheeze in determining symptoms at work was less than 0.5.⁴⁰ In a study of individuals exposed to a variety of respiratory sensitisers and irritants at work, the only predictor of incident cases of respiratory symptoms from pre-employment history was a smoking habit, which was a predictor for subsequent wheeze.⁴¹

Three case-control studies explored the association between individual risk factors and the development of OA following occupational exposure to respiratory sensitisers.^{42–44} Although there was a trend towards an association between a family or personal history of asthma, a history of atopy or hay fever and the development of OA, when adjusted for confounders these associations were not significant at the 5% level.

Mathematical modelling of a study of potroom workers showed that the PPV of PEHS was 20% when the incidence rate of potroom asthma in the plant was 40 cases per 1,000 employees/year.⁴⁵ At this rate the number of pre-employment health assessments needed to prevent one case (number needed to treat, NNT) of OA was 138 and the number of employees who need to be rejected (number needed to reject, NNR) at pre-employment to reduce the number of cases of OA by one was five. However, when the level of fluorides that employees were exposed to was reduced (as determined by urinary fluoride levels) through the introduction of control measures, the incidence of OA fell to five new cases per 1,000 employees/year. At this rate the PPV fell to 7%, the NNT rose to 4,000 and the NNR rose to 14.

Internal validity of papers

Table 6. A summary of the studies assessing the effectiveness of PEHS by questionnaire in predicting the development of work-related respiratory symptoms and occupational asthma (OA).

First author and date	Study design	Screening tool or case selection criteria	Response rate (%)	Study population	Research question and design	Length of follow-up	Main results (including effect size(s) and confidence intervals for each outcome, if available)	Confounders and biases accounted for?
Cookson W (1986) ⁴⁰	Prospective cohort	Questionnaire based on the 1976 British Medical Research Council questionnaire. First questionnaire administered by face-to-face interview and follow-up by telephone interview.	82.7	127 consecutive recruits to temporary grain storage attendant posts at beginning of 1982/3 harvesting season in Western Australia. Mean age 20, 15.7% were female.	To determine if a history of respiratory symptoms (cough, sputum production, shortness of breath or wheezing) or a history of a diagnosis of bronchitis or asthma were associated with respiratory symptoms experienced at work, after exposure to grain dust.	Mean 6.6 weeks (SD 2.6 weeks).	There were significant associations between pre-employment symptoms of wheeze and dyspnoea and the occurrence of cough and dyspnoea at work. Multiple linear regression analysis showed that the only significant determinant of cough at work was a history of wheeze, the coefficient of determination, $R^2 = 0.15$. The determinants of dyspnoea at work were a history of dyspnoea. The PPV of a history of wheeze in determining symptoms at work was low, cough = 0.4, wheeze = 0.44, and dyspnoea = 0.4.	Smoking, age, sex and previous exposure were accounted for in the multiple linear regression analysis.
Talini D (2006) ⁴¹	Prospective cohort	Standardised interview-based questionnaire.	54	448 (248 males, 200 females) new apprentices in three OH units in Italy attending pre-employment evaluation for jobs which exposed them to a variety of respiratory irritants and sensitisers.	Evaluation of the effects of occupational exposure to a variety of respiratory sensitisers and irritants on the incidence of respiratory symptoms during the first year of work. Respiratory symptoms measured included any cough, chronic cough, wheeze, dyspnoea, shortness of breath with wheeze, and a history of previous or current asthma.	1 year.	No significant difference in prevalence of respiratory symptoms between the first and second survey. The only predictor of incident cases of respiratory symptoms from history was smoking habit for wheeze ($p=0.004$).	Age, gender, respiratory symptoms, atopy, smoking, and past personal or family history of pulmonary disease were taken into account as predictors. Biases not accounted for – 54 subjects were excluded at follow-up because they had less than six-months' exposure. Response rate less than 60%.
Barnard CG (2004) ⁴⁴	Nested case-control	Selection criteria for cases were defined by the Australian Aluminium Council and were consistent with the American Thoracic Society guidelines.	NA	A cohort of 545 workers employed in an Australian aluminium smelter between 1982 and 1995 with at least weekly exposure to fluoride dust and fumes. The 45 cases diagnosed with OA of aluminium smelting were matched with 225 controls. Exposure levels were divided into quartiles.	To assess the significance of individual risk factors, in the development of OA in aluminium smelting.	Cases mean 10 years, controls mean 11 years.	The adjusted OR for hay fever was 2.28 (95% CI 0.76 to 6.89). A family history of asthma, history of bronchitis, childhood asthma and wheeze at pre-employment revealed increased but non-significant ORs. There was no significant association with tobacco smoking.	Controls were matched for age and year of commencing employment. Age, ethnicity, year of employment, smoking and weight were considered as potential confounders.

continued

Table 6. A summary of the studies assessing the effectiveness of PEHS by questionnaire in predicting the development of work-related respiratory symptoms and occupational asthma (OA) – continued

First author and date	Study design	Screening tool or case selection criteria	Response rate (%)	Study population	Research question and design	Length of follow-up	Main results (including effect size(s) and confidence intervals for each outcome, if available)	Confounders and biases accounted for?
Sorgdrager B (1995) ⁴²	Nested case-control	Cases were potroom workers who were unable to work because of work-related respiratory disease, who attended the OH department and met the criteria for potroom asthma. Self-administered pre-employment questionnaire enquiring about current, past and family history of respiratory symptoms.	NA	364 (182 cases, 182 controls) potroom workers from two Dutch aluminium producing plants.	Pre-employment data on current respiratory symptoms, respiratory problems in childhood and a family history of chronic non-specific respiratory disorders were analysed to identify workers with an increased risk of developing potroom asthma.	<i>Plant A</i> 10 years maximum. <i>Plant B</i> 20 years maximum.	More cases than controls had respiratory problems in childhood and there was a trend towards a positive family history in cases as compared to controls. However, multiple regression analysis showed that these factors were not significantly related to the presence of potroom asthma.	Cases were matched for age and year of starting employment. Logistic regression analysis controlled for smoking, lung function, respiratory problems in childhood, family history and eosinophil count.
Meredith S (2000) ⁴³	Case-control	Cases were workers with OA reported to the SWORD project by occupational physicians, without further diagnostic tests.	NA	Cases and controls were selected from two UK companies. Company A included six factories with exposure to toluene diisocyanate and 4,4-diphenylmethane diisocyanate (MDI). Company B included one plant with MDI exposure. Reliable exposure measurements were available from each company.	To explore the role of atopy and smoking in the occurrence of OA due to exposure to isocyanates.	Company A median 30 months (cases and controls). Company B median 48.2 months (cases) and 97.2 months (controls).	OA was associated with a pre-employment history of atopy (history of either hay fever, eczema or asthma) adjusted OR 3.4 (95% CI 0.85 to 13.4) p=0.08 and less strongly with smoking at the time of employment adjusted OR 2.4 (95% CI 0.84 to 7.4) p=0.11. However, these results were not significant at the 5% level.	Matched for age, sex and duration of employment. OR adjusted for smoking at time of employment and history of atopic conditions (eczema, asthma or hay fever) and level of isocyanate exposure. Case ascertainment was by different occupational and respiratory physicians, with no standardised diagnostic test.
Sorgdrager B (2004) ⁴⁵	Mathematical modelling	Atopy history definition: one or two positive answers to an enquiry of allergic respiratory diseases in childhood or of a history in the family.	NA	The distribution of personal risk data and proportion of test positive/negative workers developing potroom asthma derived from a nested case-control study (182 cases and 182 controls) in two Dutch aluminium producing plants (see ⁴²). Two periods: a) 1976–82 high incidence rate of potroom asthma = 40 cases/1,000 employees/year (0.04). b) 1982–90 low incidence rate = 5 cases/1,000 employees/year (0.005).	To evaluate the effectiveness of PEHS in this population by calculating the PPV of PEHS, the numbers of PEHS needed to prevent one case of OA (NNT) and the number of rejections needed to reduce the number of cases of OA by one (NNR).	2 years in the original case-control study.	When the incidence rate = 0.04, PPV=20%, NNT=138, NNR=5. When the incidence rate = 0.005, PPV=7%, NNT=400, NNR=14	Applicants who declared current respiratory complaints at pre-employment, including asthma, were not employed in potrooms. Applicants with bronchial hypersensitivity without symptoms were not employed after 1982. The limited follow-up period of 2 years may have led to an underestimation of the incidence of potroom asthma.

CI = confidence interval; NNR = number needed to reject; NNT = number needed to treat; PEHS = pre-employment health screening; PPV = positive predictive value; OH = occupational health; OR = odds ratio; SD = standard deviation.

Back pain

Only one study met the inclusion criteria and was acceptable methodologically.⁴⁶ This prospective cohort study was of female nursing students commencing training in Helsinki and investigated the association of a history of medical problems at pre-employment with future BP in employment. Questionnaires were used to collect data on constitutional and behavioural factors, occupational exposures and back-related symptoms and disability. BP was divided into three groups: sciatic BP, BP of sudden onset and other (all other symptoms of pain in the back). The trainee nurses were followed up for 7.5 years. As would be expected, both the lifetime and one-year prevalence of BP increased over a five-year period. However, in a multivariate analysis only ‘other’ BP and related disability were associated with a history of BP at entry to nursing school.

Table 7. A summary of the study assessing the effectiveness of PEHS by questionnaire in predicting the development of back pain in the workplace.

First author and date	Study design	Screening tool or case selection	Response rate (%)	Study population	Research question and design	Length of follow-up	Main results (include effect size(s) and confidence intervals for each outcome, if available)	Confounders and biases accounted for?
Videman T (2005) ⁴⁶	Prospective cohort	Standardised questionnaires were used to collect data on constitutional and behavioural factors (Middlesex Hospital Questionnaire and Maudsley Personality Inventory), occupational exposures and back-related symptoms and disability (Oswestry Low Back Pain Disability Questionnaire). BP was grouped into: 1) sciatic BP (BP radiating to the leg) 2) sudden BP (a sudden attack of BP) 3) other BP (all other symptoms of pain in the back).	68	255 female nursing students starting in nursing school over four consecutive years (1980–4) in Helsinki, Finland.	To investigate the prevalence of BP from entering nursing school through 5 years in nursing and to explore the determinants and modifiers of BP and disability.	7.5 years (2.5 years as a student and 5 years as a qualified nurse).	The lifetime cumulative prevalence of BP increased from 31% at entry to school to 72% at the end of school and to 82% after 5 years as a nurse. The 1-year prevalence of any BP was 54% for the first year in school, 57% for the first year as a nurse and 64% for the fifth year as a nurse. In multivariate analysis: only ‘other BP’ and related disability were associated with a history of BP at entry to school OR 7.1 (95% CI 1.5 to 34; and OR 3.6 (95% CI 1.2 to 11) respectively.	Multivariate analysis adjusted for age, BP, patient handling skills, sit-ups, twisted/bent work positions, job satisfaction, extraversion, hysteria, number of children and smoking history. Males were excluded.

BP = back pain; CI = confidence interval; OR = odds ratio.

Sickness absence/ill-health retirement/relocation or restriction

Two retrospective cohort studies explored whether specific risk factors identified at pre-placement health assessment could predict subsequent sickness absence.^{39,47} The second of these also looked at ill-health retirement, relocation and restrictions as employment outcomes.⁴⁷ The following models were found to be very weak predictors of higher levels of sickness absence:

- currently off work:
 - with a long-term sickness
 - with a chronic illness which is poorly controlled
 - undergoing a life crisis such as bereavement, divorce
 - with a terminal illness
- more than three spells (>one week each) of sickness absence per year for two or more years

- three or more episodes of low BP particularly if one is >one month in duration or associated with specialist treatment, for example surgery for multiple level lumbar disc disease
- ischaemic heart disease which is symptomatic or associated with an abnormal exercise test
- body mass index >35 kg/m²
- three or more interventions for anterior knee pain, osteoarthritis of knee with loss of joint space, osteochondritis dissecans or recurrent effusions of the knee.

These factors individually account for up to 3.3% of the variance in sickness absence. The best combination model accounted for only 12% of the variance.

Individuals who declared back conditions, upper limb disorders or neck disorders at pre-employment were more likely to require restrictive duties in employment than non-declarers but were not at increased risk of ill-health retirement.

Table 8. A summary of the studies assessing the effectiveness of PEHS by questionnaire in predicting sickness absence.

First author and date	Study design	Screening tool or case selection	Response rate	Study population/setting	Research question and design	Length of follow-up	Main results (including effect size(s) and confidence intervals for each outcome, if available)	Confounders and biases accounted for?
Lucey S (MFOM 2006) ³⁹	Retrospective cohort	Pre-placement questionnaire.	NA	400 employees (339 females, 61 males) commencing employment with Stockport NHS Trust between January 1998 and June 2000 who were still employed in December 2003.	To assess if specific risk factors identified at pre-placement health assessment could predict subsequent sickness absence. Specific risk factors were grouped into three hypothetical 'risk' categories – high, medium and low – based on hypothesis medical predictors of sickness absence in the literature.	3.5 years to 6.0 years	Mean SA episodes/year worked and mean SA hours/1,000 hours worked, was highest in the high-risk categories and lowest in the low-risk categories. Having a medical condition which falls into the high-risk category only accounted for 3.3% variance in the SA episodes/year predicted and 3.0% of the variation in the SA hours/1,000 hours worked. A multi-linear regression model taking into account smoking status, pre-employment SA days, gender and age predicted 11.4% of the variation of SA episodes/year. A similar model also taking into account low BP episodes predicted 11.9% variation in SA hours/1,000 hours worked.	Confounders included as potential predictors in logistic regression model. The author discussed possible biases: exclusion of employees who left the trust during the study period (this group may have had more health problems), and employee self-report on pre-employment questionnaires (may under-report problems through recall bias or intentional misrepresentation). 26 cases were excluded because of: missing pre-employment data (2), pre-employment form completed outside years being studied (6), OH notes missing (15). These 26 excluded cases replaced with next consecutive 26 staff employed. The results may not be applicable to non-healthcare staff and the majority of the subjects were female.
Ryan SM (MFOM 2004) ⁴⁷	Retrospective cohort	Pre-placement questionnaire.	NA	594 individuals who joined as UK airport security staff between January 1993 and December 2002.	To determine the predictive capacity of a declared MSD at pre-employment. The outcomes considered were: sickness absence rate, work restriction, work relocation, ill-health retirement and leaving rates.	Maximum 9 years	Crude rates showed that compared to 'non-declarers', BP MSD 'declarers' had a higher rate of restriction of duties at work, and a higher total SA rate. Those declaring upper or lower limb disorders had a higher rate of SA due to MSDs and 'lower limb declarers' also had a higher total SA rate. Those declaring upper limb or neck disorders had a higher job restriction rate compared to non-declarers.	Age, sex, smoking, alcohol, psychiatric history declared at pre-employment and years in employment were identified as confounders but no logistic regression analysis was undertaken.

BP = back pain; MSD = musculoskeletal disorder; OH = occupational health; SA = sickness absence.

Discussion

Little empirical research was found on the effectiveness of PEHS by questionnaire to detect future occupational outcomes. Papers that met the quality criteria for inclusion in the review covered only a few specific areas: predictors of respiratory symptoms, BP, sickness absence, work restrictions, relocation and ill-health retirement. Because little high quality research has been carried out in the pre-employment setting, this section also considers studies on predictors of health outcomes to inform conclusions and recommendations.

The review findings suggest that PEHS by questionnaire has a low sensitivity and specificity in determining the onset of work-related respiratory symptoms or BP. PEHS also appears to be a poor predictor of sickness absence and restriction of work activity. Even if the strongest health

predictors of future sickness absence are present at pre-employment, they only account for a maximum of 12% variance in future sickness absence in NHS employees.

The review found no evidence that pre-employment screening is a useful tool for determining future ill-health retirement or increased risk of accidents at work. These findings are echoed in a recent non-systematic review of the evidence base for pre-employment medical screening published by the World Health Organization.⁴⁸

These findings are not surprising as the PPV of a test is dependent on the prevalence of the disease in the population to be screened. As was shown in the study on potroom workers, when the incidence of potroom asthma decreased so did the PPV of the questions asked at pre-employment.⁴⁵ The study indicated that the prevention of OA is better achieved by reducing the level of airborne sensitizers than by seeking out and excluding 'susceptible' individuals.

Another example is the presence of atopy in workers who intend to work with laboratory animals. It is known that atopic individuals are more likely to be sensitised to animal allergens than non-atopic individuals^{49,50} and to have an increased risk of experiencing symptoms of laboratory animal allergy including asthma. But defining atopy, especially on general pre-employment screening, is difficult and up to one third of the population is atopic, not all of whom would develop allergies if working with laboratory animals.⁵¹ Stopping people with atopy from working with laboratory animals would mean excluding many who would never go on to develop animal allergy and this practice could be considered unethical. Pre-employment screening has a role in identifying susceptible individuals to ensure that they have regular health surveillance as required by statute.^{37,51}

Similar arguments may apply to other conditions, such as low back pain (LBP). While a history of 'back pain' declared at PEHS may be predictive of future non-specific BP in nurses,⁴⁶ other factors may be more relevant. In a study of nurses *in* employment, a previous history of LBP and frequent low mood at baseline were strongly associated with subsequent absence from work for BP.⁵² A longitudinal study of nurses found that a longer duration of LBP was associated with a poorer prognosis.⁵³ A systematic review identified the presence of disabling pain or sciatica as strong prognostic factors for the duration of sick leave in individuals with acute LBP.⁵⁴ Another systematic review found consistent evidence for an individual's own expectations of recovery as being the only predictor for predicting the length of sickness absence in individuals with chronic LBP. Individuals with higher expectations had less sickness absence.⁵⁵

Once in employment, individuals exposed to heavy manual work are more likely to develop BP than those in more sedentary jobs.⁵⁶ But it would not be practicable to eliminate all those individuals who declare a history of BP at pre-employment from work that involves manual handling as the lifetime prevalence of BP in the UK general population has been estimated to be between 45–64% and one-year prevalence between 27–44%.⁵⁷ Therefore, the value of ascertaining a history of the severity and duration of previous BP at PEHS might be in identifying those at increased risk of recurrence and to determine if adjustments are required to the individual's job or workplace to reduce the individual's exposure to risky manual handling.

As discussed in chapter 1 (pp 5–6), the risk of an individual with a mental health problem posing a risk to others is small and they are more likely to pose a risk to themselves than to others.⁵⁸

It is not surprising that the preventive effectiveness of PEHS for sickness absence was found to be low as the duration of absence is as much determined by socio-cultural influences as it is by an individual's health status.⁵⁹ Furthermore, individuals may fail to disclose potentially important information on their PEHQ either due to failure to recall previous ill health or due to fear that they may not be accepted for employment. There is evidence that individuals with prior repeated short sickness absence spells have a higher probability of following the same pattern in the following year.^{60,61} The evidence that a history of sickness absence is predictive of future long-term sickness absence (>6 weeks) is much weaker.⁶²

In the absence of helpful empirical data, some authors have developed theory-based principles to support decision making. Sorgdrager *et al* suggested three indicators to use when assessing the value of pre-employment screening in preventing a new case of occupational disease:⁴⁵

- the predictive value of a positive test result, corresponding to the percentage of applicants who will develop an occupational disease after a positive test result

- the number of pre-employment medical examinations needed to reduce the number of new cases of an occupational disease by one
- the number of rejections for the job, as the consequence of a positive test result, needed to reduce the number of new cases of an occupational disease by one.

de Kort and van Dijk argued that for most adverse work-related outcomes the number of potential employees who would need to be excluded from a job in order to prevent one adverse outcome, the NNR, would be unacceptably high.⁶³ Similar arguments have been made by Palmer *et al* who describe a number of indices that can aid in the evaluation of PEHS, including the number needed to be screened to prevent a single adverse outcome, the number needed to be excluded to prevent one case, and the expected incidence of the adverse outcome in those excluded.⁶⁴ The benefit of reducing the incidence of a serious adverse event by one may in certain circumstances outweigh the costs of rejecting many candidates, eg a commercial pilot. Palmer *et al* suggest that the criteria for rejection should be set in advance and should be considered against the risks to the employee, employer and third parties.⁶⁴

This current review had some limitations. Non-English language papers were excluded, however, the electronic search was broad and included follow-on papers so it is unlikely that any important papers were missed. Only pre-employment screening by questionnaire was examined. This meant that studies using questionnaires and laboratory tests in combination to determine risk factors at pre-employment were excluded. While this could be seen as a limitation, the purpose of the review was to assess the effectiveness of paper screening alone. No studies on respiratory outcomes which were undertaken in a healthcare setting were identified but there is no reason why the principles of the findings of the studies done in non-healthcare settings should not be extrapolated to the NHS. Furthermore, other types of pre-employment assessment, such as blood tests to determine sensitivity to occupational respiratory allergens, were also not included as this is currently the subject of another systematic review.

Summary

This systematic review found few studies on the effectiveness of PEHS. Those that met the inclusion criteria looked at very specific health outcomes (asthma and BP) or the work outcomes of sickness absence, work restrictions and ill-health retirement. No studies looking at whether psychological or dermatological ill health at pre-employment predicted health or employment outcomes.

The included studies either failed to identify pre-employment predictors of health and work outcomes or found very weak predictors. These weak predictors are unlikely to be of practical use as tools at the pre-employment stage of recruitment.

Chapter 4 Can the aims of PEHS, identified in the Delphi study, be met through application of the evidence base and legislation?

The purpose of PEHS as determined by consensus in round two of the Delphi study was prioritised as follows.

- 1 Identify those who have a physical or mental health condition that is likely to pose a risk to vulnerable patients.
- 2 Ensure that the applicant meets statutory medical safety standards.
- 3 Advise the employer or applicant of adjustments or restrictions which may be required under the DDA.
- 4 Identify those who have a physical or mental health condition that is likely to pose a risk to themselves.
- 5 Ensure that the applicant will not be harmed by the duties of the post.
- 6 Identify those who have a physical or mental health condition that is likely to pose a risk to the public.
- 7 Exclude those who are medically unfit for the post.
- 8 Identify those who have a physical or mental health condition that is likely to pose a risk to other employees.
- 9 Identify those who may be protected by the DDA in order to advise the employer.
- 10 Assess the applicant's physical fitness for the post.
- 11 Ensure that the applicant is able to carry out the duties of the post.
- 12 Identify those who have long-standing disability or ill health that may lead to repeated time off work.
- 13 Protect the employer where long-standing disability or ill health may lead to repeated time off work.

No evidence that PEHS by questionnaire is effective in determining purposes 1, 4, 6, 7, 8, 10, 11, 12 or 13 was found.

Purpose 2. There are few statutory medical safety standards in the NHS. Those jobs that do have statutory safety standards attached, for example, vocational driving, should be identified by the manager. The health standards that the person needs to meet should be clearly stated before PEHS and the criteria for rejection must be set in advance, as this makes the assessment more objective.

Purposes 3 and 9. Identification of individuals who may need work restrictions or adjustments could be achieved by the human resources department or the manager. They could ask the prospective employee if they have any mental or physical disabilities for which they may require adjustments in the workplace. If the individual needs further detailed functional assessment this could be done by the OH department after the applicant is offered the job.

Purpose 5. Ensuring that an applicant will not be harmed by the duties of the post is best addressed by reducing the risk as far as practicable. The majority of jobs in the NHS that may cause harm to the individual are covered by statute, for example health surveillance for those exposed to respiratory sensitisers, or by national guidance, such as exposure to hepatitis B.

Although PEHS may detect disability or ill health, the interpretation of the findings in terms of functional capacity and future health and employment outcomes is uncertain. PEHS appears to have low effectiveness in detecting future illness, sickness absence or ill-health retirement. Finally there is no evidence that PEHS can identify workers whose health prevents them from carrying out their jobs as safely as others. The paucity of evidence for the effectiveness of PEHS, its high cost, combined with the ethical and legal implications of screening suggests that whether, and how, this activity is taken forward, needs careful consideration.

Chapter 5 Conclusion and recommendations

Staff new to the NHS and those moving between NHS employers are currently required to undergo PEHS. This is mandatory as a consequence of a Secretary of State direction. In this report the function of PEHS has been considered and evidence that the process is able to meet these requirements has been sought.

The Delphi study shows that stakeholders have many views on the purpose of PEHS. The systematic review found no evidence that PEHS achieves any of the objectives identified by stakeholders. Therefore, there is a risk that the process gives false reassurance to managers. Furthermore, there is variation in PEHS processes and assessment outcomes across different NHS organisations. This can create irritation and loss of confidence for managers and job applicants and reflects poorly on the NHS as a public sector employer. Moreover, this review suggests that the process is ineffective. The Boorman review found that PEHS uses up a large proportion of senior OH resource.¹ It argues that resources could be redirected to train and support managers responsible for implementing workplace adjustments and managing staff with symptoms of a medical condition which may put their patients at risk.

In light of the findings of this review the following recommendations are made.

Recommendations

- 1 The national guidance on PEHS within the NHS should be updated. The revised guidance should be sufficiently prescriptive and detailed to ensure consistency in practice between NHS trusts.
The review shows no evidence to suggest that general health screening for employment is effective; it cannot therefore be relevant for the purpose as required by the Data Protection Act .⁴
- 2 Only jobs where there are clear, explicit health criteria should result in PEHS. The screening should assess only the criteria identified as being essential for the job. These jobs and criteria should be published by the employers in a publicly available document and included in the job description.
There are relatively few jobs where there is a published evidence-based or statutory health requirement for PEHS. Where this is the case, appointees should be identified and relevant PEHS should take place.
- 3 Each NHS employer must state explicitly, in a publicly available document, the purpose of any health screening applied to new or transferring employees, and the practical arrangements they have put in place for such screening.
This demonstrates transparency and reduces the risk that disabled applicants will be discouraged from applying through misunderstanding the purpose.
- 4 All jobs should be risk assessed, and specific workplace exposures identified, before being advertised.
It is a legal requirement under the Health and Safety at Work Act 1974 that hazards at work are identified and associated risks are assessed.⁵¹

- 5 All health screening processes applied to new employees must comply with legislation.
The Data Protection Act requires that sensitive personal information collected and processed is relevant to the purpose, accurate, proportionate and destroyed when no longer required.⁴
- 6 All health screening should take place after confirmation of appointment.
The Equality Act 2010 requires that any health screening takes place after appointment.²
- 7 Infection control processes should comply with relevant national guidance such as *Immunisation against infectious disease*.³
The evidence for some of the recommendations in the 'Green Book' are quite weak; where this is the case it is recommended that a review is carried out to establish the evidence base.
- 8 All new staff should receive an invitation to discuss with the OH department any concerns they may have about their health in relation to the job.
It is important that newly appointed staff are given an opportunity to raise any health concerns they may have so that appropriate support or adjustment can be made.
- 9 Where through direct observation, or information derived from references, an appointing manager has a specific concern about the health of the new employee, a detailed referral to OH should be made.
Managers should always have the right, where there are legitimate concerns about the health of a prospective employee, to seek advice from the OH department.

Appendix 1 Papers not included in the final review due to low internal validity

First author and date	Study design	Screening tool or case selection	Study population/ setting	Research question and design	Main results (include effect size(s) and confidence intervals for each outcome, if available)	Reasons for exclusion
Houghton A (1989) ¹⁷	Retrospective case series	Not stated	a) 224 NHS student nurse applicants screened Jan–March 1986. b) 106 other NHS employees screened Jan–March 1986. c) All 29 individuals who took retirement on ill health grounds in 1985–6. Setting: Bloomsbury Health Authority, London.	To assess effectiveness of pre-employment screening in an OH department in inner London. Outcomes: sickness absence and ill-health retirement.	a) Of the reasons given for sickness absence 20% were considered predictable from pre-employment screening. b) Of 29 IHRs, medical notes of 25 were examined. Of these, 1 person was considered to have been suffering from a condition which should have been predicted from pre-employment screening and 4 others had conditions that could possibly have been predicted.	The study was considered poor quality as unlikely to be repeatable. There was no description of the criteria used to assess/define 'predictability' of sickness absence and ill-health retirement from the pre-employment screening. No description of the pre-employment questionnaire used. No information on the causes of sickness absence or ill-health retirement and no indication if other non-medical reasons may have led to sickness absence.
Jayawardana P (2005) ⁶⁵	Retrospective case series	Not stated	239 records from 339 individuals who took ill-health retirement from three hospital trusts within a health agency in the northeast of England during . 1991–4	To describe factors related to the process of ill-health retirement.	37 (16%) individuals were ill-health retired with a condition they had at pre-employment: musculoskeletal disorders (46%) and psychiatric disorders (11%).	It is not possible to interpret these findings in terms of the effectiveness of pre-employment screening as there is no indication of how many individuals declared conditions at pre-employment who were subsequently not retired because of these conditions. In addition, the questions asked at PEHS are not detailed nor are the criteria for ill-health retirement. Furthermore, 29.5% of the IHR records were missing.

IHR = Integrated Health Records; OH = occupational health.

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