Illness deception and work: incidence, manifestations and detection

C. J. M. Poole

Department of Occupational Health, Dudley and Walsall NHS Trust, Health Centre, Cross Street, Dudley DY1 1RN, UK.

Correspondence to: Dr C. J. M. Poole. Tel: +44 (0)1384 366423; fax: +44 (0)1384 366422; e-mail: jon.poole@dudley.nhs.uk

**Background** Illness deception (ID) may be difficult to detect. Objective techniques that improve a doctor's skills of detection will have benefits for the health economy.

**Aims** To ascertain the incidence of ID in a general occupational medicine clinic, to give examples by way of case vignettes how it may manifest and to compare the variability of maximal grip strength measurements of patients with suspected simulated weakness of grip with controls.

**Methods** Four hundred consecutive new patient referrals were examined by the author and those who met Diagnostic and Statistical Manual-IV criteria for factitious disorder (FD) or malingering identified. Those with suspected simulated weakness of grip were asked to perform three consecutive maximal grips with a Jamar hand dynamometer. One hundred normal subjects and 100 patients with rheumatoid arthritis (RA) of the hands were similarly tested.

**Results** Thirty-two of 400 (8%) patients exhibited behaviour in keeping with ID (29 malingering and 3 FD). Cases included simulated hand–arm vibration syndrome, occupational asthma, deafness and weakness of a limb. The median and 90th percentile for coefficient of variation (CV) of three consecutive maximal grip strengths for normal subjects and patients with RA were 5.2, 10.5%; 5.4, 14.5% right and 4.5, 10.2%; 6.0, 14.4% left hand, respectively. The CV of the six patients who simulated weakness of grip was from 17.3 to 37.8%.

**Conclusions** ID is relatively common in occupational medical practice and multiform in its manifestations. Simulated weakness of grip should be suspected when consecutive declared maximal grip strengths are inexplicably submaximal for age and sex and highly variable in force.

**Key words** Dynamometry; factitious disorder; grip strength; illness deception; malingering; submaximal effort; work.

**Introduction**

Misleading others is a common form of human behaviour. Individual cases of deceit regularly appear in the press and fraudulent claims for state benefits are estimated to cost the UK taxpayer £800 million per year (www.dwp.gov.uk/benefit-fraud). When a patient intentionally feigns symptoms, illness or disability for psychological reasons, doctors refer to this as factitious disorder (FD), but if it is done for external gain, such as avoiding work or for money, as malingering [1]. The term illness deception (ID) is a collective term for both forms of behaviour, which may coexist in the same patient.

Its incidence in general medical or occupational medical practice is unknown but in medico-legal practice and in certain categories of benefit claimants, it has been estimated to be between 20 and 50% of cases [1,2]. Its identification relies on the doctor detecting materially relevant factual incongruities in the history, examination or investigation of the patient that cannot be explained on medical grounds and for which there is a motive. ID needs to be distinguished from somatoform disorder and a dissociative state, both of which are by definition performed unconsciously and unintentionally, but their distinction in practice may be difficult.

The manifestations of ID include symptom exaggeration or fabrication, submaximal effort on examination or testing, misrepresentation of true functional ability and the feigning of disability [3,4]. Its detection is challenging for the doctor because not only it is not part of normal medical care but also its identification can cause difficulties for the doctor–patient relationship. Dynamometry is a biomechanical technique for measuring force that may be used to detect inconsistent or submaximal muscular effort but its validity is uncertain without control data and contextual medical information. Because of the
importance of the hands to work, grip strength is commonly measured by occupational physicians.

This study was carried out to determine the incidence of ID in a general occupational medicine clinic. The consistency of maximal grip strength measurements in patients suspected of feigning weakness of grip was compared with normal controls and patients with rheumatoid arthritis (RA) affecting the hands. Case vignettes are also described to illustrate the manifestations and detection of ID.

Methods

Four hundred consecutive new patient referrals to my general National Health Service occupational medical clinic between January 2007 and January 2008 were examined to ascertain whether they fulfilled the Diagnostic and Statistical Manual-IV criteria for FD (F68.1) or malingering (Z76.5) [5], which are similarly defined in the International Classification of Diseases-10 [6]. No formal assessment of personality was undertaken and the contextual setting was expanded to include work as well as medico-legal.

Most patients were referred by managers from a variety of public and private sector employers in the Borough of Dudley in the West Midlands, UK, for advice about fitness to work of employees who were off work and in receipt of a statutory Form Med 3 from their general practitioner. A few were for second opinions from other occupational physicians. The incidence of ID was calculated and subdivided into FD and malingering.

Selected features from four anonymized case vignettes of patients referred to the author are described to illustrate the wide range of occupational medicine practice that is vulnerable to deception by patients and how inconsistencies in the history, examination or investigations led to inferences of ID. Patient details have been changed to maintain confidentiality.

The grip strength of each hand was measured for any patient attending the clinic who declared weakness of grip and fulfilled the criteria for FD or malingering, using a Jamar hand dynamometer (Sammons Preston Rolyan, Chicago, IL, USA) and compared with 100 normal adult controls attending or organizing a medical conference in the UK and 100 patients diagnosed with RA of the hands attending a local hospital rheumatology outpatient clinic. The same dynamometer was used for all measurements that was calibrated in accordance with the manufacturer’s recommendations. Normative data for grip strength in adults by age and sex for this make of dynamometer have been published [7,8].

Three consecutive measurements were taken in each hand in a standardized way with the subject seated, the shoulder adducted, the elbow flexed at 90° and the wrist in a neutral position. The handle of the dynamometer was set at the second position with the dial facing away from the subject, that is the subject was unable to appreciate or see the excursion of the handle or the hand on the dial. After each encouraged maximal grip, the dynamometer was taken from the subject, the grip force recorded in kgf and the needle returned to zero. The hand dominance, age and sex, but not name, of the subjects were recorded. Hands with mean grip strengths of <10 kgf were excluded from analysis.

All patients and normal controls gave consent to measurement. Analyses of the data were by descriptive statistics to include the coefficient of variation (CV), Kruskal–Wallis, Dunn’s test and confidence intervals (CIs) adjusted for age and sex. CV is the ratio of standard deviation (SD) to the mean of the grip strength measurements expressed as a percentage.

Results

Thirty-two of 400 (8%) patients exhibited behaviour in keeping with ID (29 were malingering of whom 22 exaggerated and 7 fabricated symptoms or signs and 3 had FD). Examples of deception included feigned weakness of an arm, weakness of a leg, blindness, deafness, difficulty with walking, non-anatomical sensory loss, bizarre dizzy spells only on night shifts, simulated epileptic fits, back pain with several abnormal illness behavioural signs [9] and declared sciatic pain in the absence of signs on examination or evidence on imaging of radiculopathy (case vignettes 1–4). Ten of 32 (31%) admitted to being involved in injury litigation, a statutory injury award or an insurance claim and 30 of 32 (94%) were not working. During the same time period 53 of 400 (13%) patients were diagnosed with an occupational illness.

Eight patients simulated weakness of grip, two of whom exerted less than a mean of 10 kgf so were excluded from analysis. The mean age (range) of the other six was 47.5 (27–55) years. Their maximal grip strength measurements are shown in Table 1. Three were being evaluated for hand–arm vibration syndrome (HAVS) (all negative), two declared incapacity for doing particular jobs due to weakness of their hands and one an inability to work due to generalized weakness.

One hundred normal subjects and 100 patients with RA underwent similar standardized testing. None of the hands of the normal subjects were excluded but 31 of the rheumatoid patients had one (14) or both hands (17) excluded from analysis due to an inability to exert a mean grip strength of 10 kgf.

The mean grip strength, SD, mean, median, 90th and 95th percentiles for CV of three consecutive maximal grip strength measurements for the normal subjects and RA patients are shown in Table 2. The right- and left-hand grip strengths of the RAs were both significantly weaker than the normal subjects (P < 0.001); however, there was no significant difference in CVs between the groups. Mean age (range) of the normal subjects and RAs were 45 (18–71) and 64 (40–92) years, respectively.
The grip strength of the simulators was significantly less than the normal but not the RA subjects ($P < 0.01$, $P = 1$ right and $P < 0.05$, $P = 1$ left hands, respectively). The CVs of the right hands of the simulators were significantly higher than the CVs of the normal ($P < 0.001$) and RA subjects ($P < 0.001$) and for the left hands ($P < 0.01$ normal and $P < 0.05$ RAs). Simulators are not included in the table due to their small number; however, their median, minimum and maximum CVs were 22.0, 17.3 and 37.8% right and 24.1, 20.0 and 33.3% left hand, respectively. That is the CVs for all the simulators were

Table 1. Maximal grip strengths of three consecutive measurements of patients feigning weakness of grip

<table>
<thead>
<tr>
<th>Patient</th>
<th>Sex</th>
<th>Age (years)</th>
<th>Right hand (kgf)</th>
<th>SD</th>
<th>CV%</th>
<th>Left hand (kgf)</th>
<th>SD</th>
<th>CV%</th>
<th>Feigned weakness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Female</td>
<td>53</td>
<td>18, 10, 10</td>
<td>4.62</td>
<td>36.5</td>
<td>12, 16, 8</td>
<td>4.00</td>
<td>33.3</td>
<td>Both hands</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>51</td>
<td>20, 12, 10</td>
<td>5.29</td>
<td>37.8</td>
<td>12, 10, 16</td>
<td>3.06</td>
<td>24.1</td>
<td>Both hands</td>
</tr>
<tr>
<td>3</td>
<td>Male</td>
<td>27</td>
<td>30, 34, 42</td>
<td>6.11</td>
<td>17.3</td>
<td>57, 58, 60</td>
<td>1.53</td>
<td>2.6</td>
<td>Right hand</td>
</tr>
<tr>
<td>4</td>
<td>Male</td>
<td>54</td>
<td>16, 10, 24</td>
<td>3.06</td>
<td>22.9</td>
<td>24, 26, 25</td>
<td>1.00</td>
<td>4.0</td>
<td>Right hand</td>
</tr>
<tr>
<td>5</td>
<td>Female</td>
<td>45</td>
<td>26, 34, 40</td>
<td>7.02</td>
<td>21.1</td>
<td>34, 38, 39</td>
<td>2.65</td>
<td>7.2</td>
<td>Right hand</td>
</tr>
<tr>
<td>6</td>
<td>Male</td>
<td>55</td>
<td>19, 16, 24</td>
<td>4.04</td>
<td>20.5</td>
<td>36, 24, 30</td>
<td>6.00</td>
<td>20.0</td>
<td>Both hands</td>
</tr>
</tbody>
</table>

Table 2. Maximal grip strengths of three consecutive measurements for normal subjects and patients with RA

<table>
<thead>
<tr>
<th>Subjects</th>
<th>n</th>
<th>Mean hand (kgf)</th>
<th>SD</th>
<th>Mean CV</th>
<th>Median CV</th>
<th>90th centile CV</th>
<th>95th centile CV</th>
<th>Mean hand (kgf)</th>
<th>SD</th>
<th>Mean CV</th>
<th>Median CV</th>
<th>90th centile CV</th>
<th>95th centile CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>100</td>
<td>38.7</td>
<td>11.1</td>
<td>5.8</td>
<td>5.2</td>
<td>10.5</td>
<td>12.5</td>
<td>37.4</td>
<td>11.1</td>
<td>5.5</td>
<td>4.5</td>
<td>10.2</td>
<td>13.1</td>
</tr>
<tr>
<td>RAs</td>
<td>69</td>
<td>17.8</td>
<td>5.9</td>
<td>7.4</td>
<td>5.4</td>
<td>14.5</td>
<td>20.4</td>
<td>17.2</td>
<td>5.5</td>
<td>6.8</td>
<td>6.0</td>
<td>14.4</td>
<td>18.4</td>
</tr>
</tbody>
</table>

The grip strength of the simulators was significantly less than the normal but not the RA subjects ($P < 0.01$, $P = 1$ right and $P < 0.05$, $P = 1$ left hands, respectively). The CVs of the right hands of the simulators were significantly higher than the CVs of the normal ($P < 0.001$) and RA subjects ($P < 0.001$) and for the left hands ($P < 0.01$ normal and $P < 0.05$ RAs). Simulators are not included in the table due to their small number; however, their median, minimum and maximum CVs were 22.0, 17.3 and 37.8% right and 24.1, 20.0 and 33.3% left hand, respectively. That is the CVs for all the simulators were

Case vignette 1 (malingering)

A labourer declared blanching, numbness, pins and needles and weakness of his hands. He had initiated litigation for HAVS. There was no photographic evidence of blanching. On examination of the hands, he declared generalized loss of sensation to light touch, pin prick, vibration and joint position sense yet he was able to play darts, drive and lead a normal life but not work. On standardized testing, thermal aesthesiometry and vibrotactile thresholds were grossly abnormal with very wide neutral zones and few reversals. Cold provocation testing was normal. His grip strength was submaximal for age and sex and the CVs of three consecutive maximal grip strengths were 21% right and 20% left hands, respectively.

Inferences—complete numbness of the hands should make gripping very difficult and loss of joint position sense should make playing darts impossible. The results of the aesthesiometry and vibrotactile tests were unreliable. Submaximal and highly variable grip strength is in keeping with insincerity of effort. The motive appeared to be financial and the diagnosis of HAVS was unsafe.

Case vignette 2 (malingering)

A machine operator in a factory where respiratory sensitizers were being used declared shortness of breath and chest tightness. He had initiated litigation for occupational asthma. He had had very little absence due to ill-health and worked many hours of overtime. His supervisor had not witnessed him showing any breathing problem. On repeated examinations by different doctors, he showed no symptoms or signs of asthma. Serial peak flow measurements (PFMs) showed a daily variability from 60 and 690 l/min with improvements at weekends when away from work. A methacholine bronchial reactivity test was normal. Supervised spirometric testing in the workplace at five different locations on six different days was normal with PFMs between 580 and 680 l/min.

Inferences—the absence of witnessed symptoms of asthma in association with grossly abnormal PFMs was inconsistent. Severe asthma would be expected to be associated with an abnormal methacholine reactivity test. Several normal spirometry measurements in the factory are not compatible with the self-recorded PFMs. The motive appeared to be financial and the diagnosis of occupational asthma was unsafe.
Case vignette 3 (malingering)
A factory worker working in ambient noise levels <80 dB(A) Leq had initiated litigation for noise-induced hearing loss (NIHL). On examination, he communicated normally in a quiet consulting room, auriscopy was normal and he was Rinne positive (AC > BC). A pure tone air audiogram that was done as part of the employers’ health surveillance programme 10 years previously was normal. However, on this occasion, the mean hearing thresholds (250–8000 Hz) for each ear with the same audiometer were between 70 and 85 dB. Two years later and after litigation, at routine surveillance his hearing thresholds had improved to a mean of 30 dB with the exception of the 8000 Hz tone being at 60 dB in keeping with his age.
Inferences—workplace not sufficiently noisy to cause NIHL. Normal conversation is inconsistent with severe hearing loss. A marked deterioration in hearing with subsequent improvement to normal is inconsistent with the physiology of hearing. How he was able to suppress his hearing thresholds across six frequencies without being detected by an experienced audiologist is unknown. The motive appeared to be financial.

Case vignette 4 (Factitious disorder)
A medical student with the diagnoses of pseudoseizures (telemetry positive) and recurrent depression, previous anorexia nervosa and self-harming behaviour was referred for a second opinion about her suitability to continue with training. Despite the support of regular psychotherapy and psychotropic medication, she continued to have simulated seizures at times of stress. Her behaviour and the arrival of the emergency services were causing disruption in her hall of residence and to lectures. On examination, her forearms were scarred. She was not depressed. She acknowledged the problems her ‘seizures’ were having but said she would not have any in hospital or any more in lectures.
Inferences—mentally and psychologically ill despite appropriate treatment, probably with a borderline personality disorder (psychiatrist to confirm). The apparent ability to control her pseudoseizures would indicate that they were under conscious control and therefore intentional rather than somatoform or dissociative in nature. The motive appeared to be psychological.

greater than the 95th percentile for the normal subjects and greater than the 90th percentile for the RAs. The difference in square roots of the mean CVs between the simulators and the control groups varied between 2.6 and 2.9 with 95% CIs of 1.5–4.1 after adjusting for age and sex.

Discussion
This study found the incidence of ID to be 8% in a general occupational medicine clinic that is almost as common as occupational illness (13%), although bias from secondary referrals and errors of case attribution cannot be excluded.
The forcible adduction of the vocal cords to simulate wheezing and the falsification of peak flow readings in association with normal methacholine challenge tests have been reported previously [10] but not the feigning of occupational asthma. Simulated deafness is usually detected by the audiologist or examining doctor but in the case described here the patient was able to consistently feign an artificial hearing threshold. The external gain for most of the malingers appeared to be financial or to avoid work.
This is the first time that grip strength measurements have been reported in patients as opposed to healthy volunteers simulating weakness of grip. The finding of submaximal grip strengths with high CVs for three consecutive grips in the simulators but not in the normal subjects (maximal grips and low CVs), or in those with diseased rheumatoid hands (submaximal grips and low CVs), intuitively seems valid as the combination of weakness of grip and low variability in grip strength is practically very difficult to consistently reproduce. Studies with normal healthy volunteers simulating weakness have been reviewed and noted to rely on the premise that patients feigning weakness will try to consistently reproduce submaximal effort but the simulators in this study made no great effort to be consistent in their efforts or if they did they did it unsuccessfully [11].
Dynamometry results that are submaximal and highly variable have traditionally been attributed to pain or pathology but these data show that even patients with diseased painful rheumatoid hands can grip consistently with a CV as low as normal subjects. Although simulators have not been excluded from the two control groups, their presence would have reduced the significant differences from the group of simulators.
Differences in CVs have been reported in lumbar dynamometry of normal healthy subjects when comparing submaximal with maximal effort [12], but this was thought to be an unreliable discriminator because unlike the six simulating patients described here, the differences in CVs were small. The same authors also studied the onset slopes of force–time curves for submaximal and maximal efforts and came to the conclusion that because the observed difference also correlated with differences in normal grip strength, they were of no use for determining sincerity of
effort; however, others have found force–time curves to be discriminatory of effort particularly in men [13].

A rapid exchange grip test has also been proposed as a way of detecting insincerity of effort [14] but found by others to be unreliable due to the lack of a standardized testing procedure [15]. The measuring of grip strength at different handle spacings for the Jamar dynamometer has been shown to produce a bell-shaped curve in healthy normal subjects and those with true weakness but a flat curve with simulated weakness [16,17] that warrants further evaluation but is likely to be more time consuming than the technique described here.

When measuring grip strength, it is important to use a standardized method and to avoid any variability due to fatigue or unfamiliarity with the technique. The author recommends that the testing protocol includes the requirement for consecutive grip measurements to be made with a pause of no less than say 10 s between each grip or that alternate hands are tested so as to allow time for recovery from muscular fatigue. The second handle position is recommended as most hand sizes will fit around it and the position will test the force of both the intrinsic and extrinsic muscles of the hand. The second and third handle positions have been shown to produce the strongest grip strengths in men and women [18,19].

It is not possible to specify a threshold CV of maximal grip strength that is indicative of insincerity of effort, but it is noteworthy that the minimum CV for the simulators (17.3%) was greater than the 90th percentile for both the normal subjects and the patients with RA. It is not suggested that a high variability in consecutive maximal grip strength measurements is an indicator on its own of ID, but it is a physical sign to be taken note of in consideration with other markers of internal consistency and inferred motivation. The technique can be used for patients declaring weakness of grip in one or both hands and also generalized weakness. While the results presented here are from a small number of simulators, they were significantly different from the control groups and the CIs were relatively small with no confounding by age or sex. The results do not constitute a body of normative data for simulators of weakness of grip but they do provide some comparative data.

This research shows that ID is relatively common in occupational medicine clinics yet there is very little teaching on the subject in the UK at both the undergraduate or postgraduate level and it also fails to appear in standard medical textbooks such as Hunter’s Diseases of Occupations or Fitness for Work. Almost every aspect of practice is open to manipulation by the patient for the purposes of secondary gain that may be for internal (psychological) or external purposes. Simulated weakness of grip should be suspected when there is a high degree of variability between three consecutive submaximal grip measurements. Variability may be expressed mathematically as a CV and compared with the normal data above. Doctors are advised to go no further with their inferences about specific patients than to describe the materially relevant factual inconsistencies and to indicate that the diagnosis may be unsafe.

### Key points
- Behaviour in keeping with illness deception is relatively common in occupational medicine practice and is multiform in its manifestations.
- Its detection relies on the identification of materially relevant inconsistencies that cannot reasonably be explained on medical grounds in association with an internal or external motive.
- Submaximal and highly variable consecutive hand grip strength measurements are suggestive of simulated weakness of grip.

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### Conflicts of interest
None declared.

### References