Return to work after lower limb amputation
K. Fisher*, R.S. Hanspal and L. Marks

This study investigated the proportion of patients who returned to work following amputation and the factors that influenced a positive or negative outcome. One hundred patients of working age who had sustained unilateral lower limb amputation at least 1 year previously and who were established prosthesis users participated in the study. A specially designed questionnaire similar to a guided interview was administered by the rehabilitation physician at the patients’ routine follow-ups. The questionnaire yielded a unique score dependent on whether return to work (or a different or preferred occupation) had been achieved with good or reduced productivity. All patients were eligible for mobility benefit, including schemes to purchase suitably adapted vehicles if necessary. However, no vocational rehabilitation was available. Sixty-six per cent of patients returned to employment and this was related to mobility, time since amputation and Handicap Scale scores. Age, socket comfort, level and cause of amputation, type of previous work or the presence of other medical problems did not differ between those who did and did not return to work. The Employment Questionnaire showed good correspondence with the London Handicap Scale, indicating some concurrent validity, although future development might include consideration of psychological factors, which could explain more of the reasons for continued unemployment. International Journal of Rehabilitation Research 2003, 26:51–56 © 2003 Lippincott Williams & Wilkins.

Introduction
Amputation of a lower limb is considered a major life-changing event and can involve severe mobility problems, compromising return to normal activities of daily living such as work. Little research has been undertaken to explore the factors associated with whether or not patients of working age are able to return to their employment. Dasgupta et al. (1997) found that in a sample of 46 male transtibial amputees who had sustained trauma, 16 of 27 (59%) who were eligible, were able to return to employment, their ability being facilitated by the use of ICEROSS sockets. Millstein et al. (1985) found that 74% of their patients were able to return to work but the sample consisted only of those who had been injured at work and more than half of this population were upper limb patients; 75% were found to have changed jobs from operating machinery to clerical occupations. Millstein et al. found that a combination of factors determined re-employment, including prosthetic use, the availability of vocational services and a younger age at the time of amputation. Factors that were negatively related to successful re-employment included stump and phantom pain and multiple limb amputations. Schoppen et al. (2001), describing the occupational situation of people with lower limb amputations in the Netherlands, found that 64% of 652 sampled patients were working 2 years or more after amputation, but they found a mean delay between amputation and return to work of 2.3 years and their patients had problems finding suitable jobs.

The aim of the present study was to investigate the proportion of established lower limb wearers in a Prosthetic Rehabilitation Centre in the UK who did not return to work after amputation and the main influences on this outcome.

Subjects
The sample comprised 100 patients attending routine prosthetic clinics. The inclusion criteria were that the patients had normal or near normal cognitive ability, they should be aged between 17 and 65 years and should have had their amputation at between the ages of 16 and 64 years. They should be an established prosthesis wearer and have had a lower limb amputation at least 1 year previously. The patients who met these criteria were 80 men and 20 women with a mean age of 47.4 years (range 26–64) and a mean time since amputation of 116 months (range 12–468 months). Fifty per cent (50 patients) had transtibial amputations and 43% (43 patients) were transfemoral. A further 7% (7 patients) had through hip or partial foot amputations. Sixty-four per cent (64 patients) had experienced trauma and a further 24% (24 patients) were suffering from vascular disorders, including diabetes; 8% (8 patients) had neoplasms.
Materials and methods

Patients were interviewed by the Rehabilitation Consultant, who administered the Socket Comfort Score (Hanspal et al., 1998) and graded the patients’ mobility on the Harold Wood/Stanmore Mobility Grade (Hanspal et al., 1991). A standardized interview was then carried out during which the London Handicap Scale (Harwood et al., 1994) was administered. The remainder of the interview consisted of an Employment Questionnaire (EQ), which was specially designed to ask about demographic variables, date, level and cause of amputation, whether the prosthesis was satisfactory and whether other medical conditions were present. The Socket Comfort Score, Mobility Grade and London Handicap Scale Total Score were also recorded on this form. Subsequent questions asked about previous and current employment status, whether former productivity levels were achieved and the factors that could have prevented this, or the perceived reasons for loss of the preferred job. This part of the questionnaire had a score range from 0 = doing nothing and previously unemployed, to 18 = return to full employment with good productivity at a preferred job. The questionnaire took the form of a guided interview in which some sections were omitted if the answer to the previous question rendered them redundant. Thus the score at the end of the questionnaire also uniquely described the patient’s situation with regard to the reasons for not working or having reduced productivity (see Appendix).

The results were treated with frequency analysis and relationships between the results of the EQ and age, type of previous work, level of amputation, cause and time since amputation, Socket Comfort score, Mobility and the London Handicap Scale were analysed by non-parametric correlations. The differences on these factors between those who did and did not return to work were analysed by the Mann–Whitney U test (SPSS, 1996).

Results

Before amputation 92% (92 patients) of the sample were at work. After the amputation 66% (66 patients) were employed either outside or in the home, 17% (17 patients) reported doing nothing and the remainder were retraining (4%) or retired (14%). The prosthesis was recorded as satisfactory in 84% (84 patients). Other medical conditions were present in 21% (21 patients). These were mainly other vascular problems, including heart disease and stroke, and other neurological or orthopaedic problems, including associated brachial plexus injury or fracture. Overall, the mean score for the Socket Comfort Scale was 6.9 and for the London Handicap Scale 11.3. The modal Harold Wood/Stanmore Mobility Score was 5 (independent in- and outdoor walking). The types of work people were engaged in before amputation are summarized in Table 1.

The cut-off score for the EQ was 13, which indicated that the patient had returned to work. Fifty-seven per cent (i.e. 38 patients) of the 66 patients at work were in the same job and 43% (28 patients) were in a different job, of whom 15 (54%) were in a preferred occupation. The majority of employed patients (68%, 45 patients) reported their productivity to be as good as before. Of the 25 patients who reported reduced productivity, the reasons given were problems with the prosthesis (12 patients, 48%), other physical problems (5 patients, 20%) and transport difficulties (7 patients, 28%). One of these patients, (4%) complained of depression. Eighteen per cent of this group (12 patients) had other medical problems.

Thirty-four per cent (34 patients) were not employed after the amputation, of whom 6 (18%) were not working because of continued illness, 21 (62%) had amputation- or prosthesis-related problems and 2 (6%) had domestic problems such as severe illness in another family member. Five of the eight patients who were not at work before the amputation remained unemployed but three of these regained some work. Twenty-six per cent of this group (9 patients) had other medical problems.

The factors associated with scores on the EQ were time since amputation (tau = 0.21, P < 0.01), age (tau = −0.20, P < 0.01), mobility (tau = 0.45, P < 0.001) and the London Handicap Scale (tau = −0.49, P < 0.001), of which the sections on mobility, self-care, work and finance were particularly relevant. Mann–Whitney tests between those patients who were in work and those who were not showed that time since amputation was significantly different (u = 750, P < 0.01) (mean months since amputation were 138 for those in work and 75 for those not). Mobility (u = 497.5, P < 0.001) and London Handicap Scale (without the work section) were significantly different (u = 362.5, P < 0.001).

The following factors were significantly different: Socket Comfort score (tau = –0.40, P < 0.001), age (tau = –0.20, P < 0.01), sex (tau = 0.42, P < 0.001), level of amputation (tau = –0.40, P < 0.001), previous employment (tau = −0.47, P < 0.001), and retraining (tau = 0.41, P < 0.001). The factors associated with scores on the EQ were time since amputation (tau = 0.21, P < 0.01), age (tau = −0.20, P < 0.01), mobility (tau = 0.45, P < 0.001) and the London Handicap Scale (tau = −0.49, P < 0.001), of which the sections on mobility, self-care, work and finance were particularly relevant. Mann–Whitney tests between those patients who were in work and those who were not showed that time since amputation was significantly different (u = 750, P < 0.01) (mean months since amputation were 138 for those in work and 75 for those not). Mobility (u = 497.5, P < 0.001) and London Handicap Scale (without the work section) were significantly different (u = 362.5, P < 0.001). Age, socket comfort, level or cause of amputation, type of previous work and the presence of other medical problems did not

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Characteristics of the patient sample (n=100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Mean 47.4 years (SD 11.05)</td>
</tr>
<tr>
<td>Time from amputation</td>
<td>Mean 116 months (SD 113.1)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>80%</td>
</tr>
<tr>
<td>female</td>
<td>20%</td>
</tr>
<tr>
<td>Level of amputation</td>
<td></td>
</tr>
<tr>
<td>transfemoral</td>
<td>43%</td>
</tr>
<tr>
<td>transtibial</td>
<td>50%</td>
</tr>
<tr>
<td>other</td>
<td>7%</td>
</tr>
<tr>
<td>Previous employment</td>
<td></td>
</tr>
<tr>
<td>professional</td>
<td>7%</td>
</tr>
<tr>
<td>managerial</td>
<td>20%</td>
</tr>
<tr>
<td>clerical</td>
<td>10%</td>
</tr>
<tr>
<td>skilled manual</td>
<td>40%</td>
</tr>
<tr>
<td>unskilled manual</td>
<td>15%</td>
</tr>
<tr>
<td>unemployed</td>
<td>8%</td>
</tr>
</tbody>
</table>

Other medical conditions were present in 21% (21 patients). These were mainly other vascular problems, including heart disease and stroke, and other neurological or orthopaedic problems, including associated brachial plexus injury or fracture. Overall, the mean score for the Socket Comfort Scale was 6.9 and for the London Handicap Scale 11.3. The modal Harold Wood/Stanmore Mobility Score was 5 (independent in- and outdoor walking). The types of work people were engaged in before amputation are summarized in Table 1.

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The results of the London Handicap Scale showed that the mean score for patients at work was 9.9 and not at work 14.4. This is a statistically significant result \((P < 0.001)\) and suggests a cut-off score of 13 discriminates those working from those not. Seventy-one per cent of those not at work (24 patients), but only 17% (11 patients) of those at work scored higher than this.

The correlation between the total London Handicap Scale and the EQ it was \(-0.52\) and between the work and leisure section and the EQ it was \(-0.46\). These were both significant at \(P < 0.01\).

### Discussion

Following amputation, 66% of this sample of patients had returned to work at least 1 year later, a finding that is consistent with the recent report by Schoppen et al. (2001) and higher than that reported by Dasgupta et al. (1997), who found 59% actively employed when surveyed. Millstein et al. (1985) were able to show a higher return to work rate but their patients were all injured at work and were offered re-employment by their employers. They also benefited from vocational counseling services, which are largely lacking in the UK. In spite of this, 17% of those who did return to work (11 patients) were back in their jobs less than 2 years after amputation and 10% (7 patients) within 1 year. The positive but small correlation between time from amputation and higher scores on the EQ, suggesting more likelihood of return to work, indicated that more people regained employment as time went on. This was also true of the difference between time from amputation in the employed and not-employed groups, the mean time of the employed groups being much longer than that of the other, although this was more than 6 years, suggesting that time itself was not a strong factor.

The EQ has shown utility in this study because it has been able to identify not only the number who were able to return to work, but also the reasons for not working, or for experiencing reduced productivity at work.

The sample of patients in this study was selected mainly on age criteria to be sure they were within the relevant age for a working population (retirement age is 65 in the UK) and for this reason the proportion of patients who actually returned to work is higher than was originally perceived. This was because the majority of patients in limb-fitting centres are over the age of 65, and were excluded from the sample because they would have retired.

Although mobility is, not surprisingly, a relevant factor in return to work, the lack of a relationship with level of amputation, other medical problems, reported socket comfort or type of previous work is contrary to expectations. In fact, a larger number of transfemoral versus transistibial amputated patients remained in the unemployed group and although other medical problems were less prevalent and socket comfort was marginally better in the employed group, these did not reach statistical significance. These findings suggest that factors other than the physical status of the patient \(per se\) might influence return to work. Mobility benefits, including schemes to purchase suitably adapted vehicles, were available to all appropriate patients and although seven patients reported transport problems, these were all in the employed group. Lack of suitable transport did not feature as a reason for non-return to work. No attempt was made to assess ‘personality’ variables with psychometric instruments but factors such as motivation, job satisfaction and interpersonal relationships in the

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**Table 2 Factors association with return to work**

<table>
<thead>
<tr>
<th>Correlation with EQ total score</th>
<th>Average score employed</th>
<th>Average score not employed</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>**</td>
<td>46.4 years</td>
<td>49.4 years</td>
</tr>
<tr>
<td>Level of amputation: transfemoral versus transistibial</td>
<td>NS</td>
<td>48% versus 47%</td>
<td>32% versus 56%</td>
</tr>
<tr>
<td>Cause of amputation: illness versus trauma</td>
<td>NS</td>
<td>33% versus 66%</td>
<td>41% versus 59%</td>
</tr>
<tr>
<td>Time since amputation</td>
<td>**</td>
<td>138 months</td>
<td>75 months</td>
</tr>
<tr>
<td>Other medical problems present</td>
<td>NS</td>
<td>18%</td>
<td>26%</td>
</tr>
<tr>
<td>Socket Comfort Score</td>
<td>NS</td>
<td>7.0</td>
<td>6.1</td>
</tr>
<tr>
<td>Mobility</td>
<td>***</td>
<td>5 (mode)</td>
<td>4 (mode)</td>
</tr>
<tr>
<td>London Handicap Score</td>
<td>***</td>
<td>9.9</td>
<td>14.4</td>
</tr>
<tr>
<td>Type of previous work: skilled versus unskilled</td>
<td>NS</td>
<td>88% versus 12%</td>
<td>79% versus 21%</td>
</tr>
</tbody>
</table>

NS, no significant correlation or difference.

**Significant score at \(P<0.01\).**

***Significant score at \(P<0.001\).**
workplace need to be taken into consideration and could form the basis of a future study.

Although about two-thirds of our patients were able to return to work, inclusion of a vocational counselling service, as recommended by the British Society of Rehabilitation Medicine (BSRM, 2000) might have increased the percentage to one nearer to Millstein’s 74%. Such a service is currently unavailable but needs to form part of a comprehensive rehabilitation facility. Tate (1992) also recommends that rehabilitation counsellors (including vocational counsellors) can play a critical role in influencing factors that facilitate return to work. Similarly, Arokoski et al. (2002) have found that vocationally oriented medical rehabilitation programmes reduced physical and mental stress, although they were unable to reduce absenteeism in different occupational groups. Thus, with access to such a service, the reasons given by those who were unemployed after amputation might have been addressed more effectively, with concomitant reduction in Handicap Scores and improved quality of life.

**Acknowledgements**

Thanks are due to Drs Jan Gawronski and Amina Khatoon for help with data collection and to the patients who allowed the survey to be undertaken.

The authors are happy for the Employment Questionnaire (see Appendix) to be used by other centres if they would find it helpful, and would be grateful for any feedback as to its development.

**References**


BSRM (2000). Vocational rehabilitation, the way forward. A working party report commissioned by British Society for Rehabilitation Medicine. Available online: www.BSRM.co.uk


Appendix: Employment Questionnaire

EMPLOYMENT QUESTIONNAIRE

Name __________________________ Date __________________

1. Age ______ 2. Sex _______ 3. Date of amputation _________________

4. Level of amputation TH TF KD TT Sym/AD

5. Cause of amputation ________________________________

6. Is the prosthesis satisfactory? Y N

7. Other medical conditions ________________________________

8. Socket Comfort Score 0 __________________ 10

9. Mobility Grade I II III IV V VI

10. Handicap Scale – London Handicap Scale Total Score ________________

11. Do you consider yourself
   a. at work:
      a1. employed? Y N          c. student? Y N
      a2. self-employed? Y N     d. retraining? Y N
   b. running the home? Y N     e. medically retired? Y N
   f. doing nothing? Y N

   If response is a, b or c go to 12
   If response is d or e go to 13
   If response is f go to 18

12. Have you returned to your previous work? Y N

   If Y What is it? ________________________________ Go to 15

   If N What was it? ______________________________ Go to 13

13. Have you returned to work in a different job (incl. now running the home)? Y N

   If Y go to 14
   If N go to 18

14. Is this job a preferred occupation? Y N

   If N go to 17 and then discontinue interview
   If Y go to 15
15. Is your productivity level as good as before?  Y  N

If Y discontinue interview
If N go to 16 and then discontinue interview

16. Is your productivity reduced because (choose the most important)
   a. you have physical problems to do with discomfort from prosthesis?  Y  N
   b. you have physical problems to do with environmental difficulties/travelling?  Y  N
   c. you have other physical problems?  Y  N
   d. you have non physical problems?  Y  N
      1. worry  
      2. depression  
      3. loss of confidence  
      4. self consciousness  
      5. other non physical  

17. Do you mainly attribute the loss of your preferred occupation to (choose the most important)
   a. Continued illness?  Y  N
   b. your amputation?  Y  N
   c. your unsatisfactory prosthesis?  Y  N
   d. difficulty travelling/access?  Y  N
   e. worry?  Y  N
   f. depression?  Y  N
   g. loss of confidence?  Y  N
   h. other?  Y  N

18. Were you at work before your amputation?  Y  N  If yes what was your job?  

If Y go to 17
If N go to 19

19. Before your amputation were you not working because
   a. you were on extended sick leave because of difficulty with your limb before 
      amputation?  Y  N
   b. unemployed for less than 6 months because of difficulty with your limb before 
      amputation?  Y  N
   c. unemployed for more than 6 months because of difficulty with your limb before 
      amputation?  Y  N
   d. unemployed for less than 6 months for other reasons than to do with your limb?  Y  N
   e. unemployed for more than 6 months for other reasons than to do with your limb?  Y  N

<table>
<thead>
<tr>
<th>Total score</th>
<th>11a) 15Y = 0 + Q11</th>
<th>15N = Discount any previous score</th>
<th>18Y = 0 + Q17</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) = 17 + Q15</td>
<td>16a = 16</td>
<td>19a = 4</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>16b = 15</td>
<td>b = 3</td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>16c = 14</td>
<td>c = 2</td>
<td></td>
</tr>
<tr>
<td>11e) = 0 + Q18</td>
<td>16d = 13</td>
<td>d = 1</td>
<td></td>
</tr>
<tr>
<td>f)</td>
<td></td>
<td>e = 0</td>
<td></td>
</tr>
<tr>
<td>12Y = 0 + Q15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12N = 0</td>
<td>17a = 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13Y = 0 + Q15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13N = 0</td>
<td>17b = 11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14Y = Add 1 to total</td>
<td>17c = 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14N = 0</td>
<td>17d = 9</td>
<td></td>
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<tr>
<td></td>
<td>17e = 8</td>
<td></td>
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<td></td>
<td>17f = 7</td>
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<tr>
<td></td>
<td>17g = 6</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>17h = 5</td>
<td></td>
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