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Impact of Work-Related Burn Injury on Social Reintegration Outcomes: A Life Impact Burn Recovery Evaluation (LIBRE) Study

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Abstract

Objective: To examine differences in long-term social reintegration outcomes for burn survivors with and without work-related injuries.

Design: Cross-sectional survey.

Setting: Community-dwelling burn survivors.

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Participants: Burn survivors (N=601) aged ≥18 years with injuries to ≥5% total body surface area or burns to critical areas (hands, feet, face, or genitals).

Interventions: Not applicable.

Main Outcome Measures: The Life Impact Burn Recovery Evaluation Profile was used to examine the following previously validated 6 scale scores of social participation: Family and Friends, Social Interactions, Social Activities, Work and Employment, Romantic Relationships, and Sexual Relationships.

Results: Older participants, those who were married, and men were more likely to be burned at work ($P<.01$). Burn survivors who were injured at work scored significantly lower on the Work and Employment scale score after adjusting for demographic and clinical characteristics ($P=.01$). All other domain scale scores demonstrated no significant differences between groups. Individuals with work-related injuries scored significantly worse on 6 of the 19 items within the Work and Employment scale ($P<.05$). These individuals were more likely to report that they were afraid to go to work and felt limited in their ability to perform at work.

Conclusions: Burn survivors with work-related injuries report worse work reintegration outcomes than those without work-related injuries. Identification of those at higher risk for work reintegration challenges after burn injury may enable survivors, providers, employers, and insurers to better use appropriate resources to promote and target optimal employment outcomes.

Keywords

Burns; Community integration; Employment; Rehabilitation; Return to work

Burn injuries are associated with a variety of long-term challenges, including significant physical, psychological, and social complications. As advances in acute burn care have greatly reduced mortality, community reintegration has emerged as a central goal of rehabilitation after burn injury.[1,2] Many survivors are able to attain a satisfying quality of life postinjury; however, 30% of adult burn survivors consistently report moderate to severe psychological or social difficulties.[2-4] Burn injuries can significantly disrupt social involvement, including employment, time spent with family and friends, and intimate relationships.[5,6] Functional impairment resulting from burn injury can further limit an individual's ability to fulfill previous social roles, intensify social isolation, and introduce financial hardship.[7,8] Despite previous research demonstrating these challenges, most existing follow-up measures focus on physical rather than social outcomes; little is known regarding survivors' long-term recovery and return to their communities.[9]

One important aspect of reintegration into society postinjury is return to employment. For many survivors, returning to work indicates significant community participation and constitutes a milestone in the recovery process.[10] Many factors, including burn size, physical ability, and psychological issues, are obstacles to community participation and can cause significant job disruption postinjury.[11,12] A 2-center study[13] found that 66% and 90% of burn survivors had returned to work at 6 and 24 months, respectively. One center found that only 37% of burn survivors returned to the same job with the same employer and without accommodations, demonstrating the substantial impact of burns on work.

Literature in other fields has shown that being injured at work can affect recovery. Several studies[14,15] have found that the psychological symptoms developed after occupational injuries can complicate social participation, including return to work. Those injured at work also report a limited ability to fulfill expected social roles and participate in community activities.[16] However, this is an area of relatively limited investigation, and little is known about the specific effects of work-related injuries on community reintegration outcomes for burn survivors. In the present study, we compared multidimensional community participation outcomes for burn survivors with and without work-related injuries.

Methods

Study design

This is a secondary analysis of a cross-sectional survey study of adult burn survivors. The data were collected as part of the field testing of the Life Impact Burn Recovery Evaluation (LIBRE) Profile.[9,17,18]

Participants

Community-dwelling burn survivors were recruited between October 2014 and December 2015 through burn peer support groups, social media, burn clinics, the Phoenix Society for Burn Survivors, and the 2014 and 2015 Phoenix World Burn Congresses. Survivors aged ≥18 years with injuries to ≥5% total body surface area (TBSA) or to critical areas (hands, feet, face, or genitals) and who had not previously participated in earlier phases of the LIBRE study were eligible for inclusion in the study.

Outcome measure

Burn survivors were administered the LIBRE-192, which contains 192 items used for field testing of the LIBRE Profile. These items examine several areas of community participation after burn injury.[9,17,18] The development of the 126-item LIBRE Profile from the LIBRE-192 has been described previously.[19]

Participants completed the LIBRE-192 in person, over the phone, or online via a website. Individual items were coded on a 5-point Likert scale (1—5), with higher scores indicating better outcomes. Specific items were reverse-coded as necessary. The final 126-item LIBRE Profile was previously validated using exploratory and confirmatory factor analyses and contains 6 scales that examine the following domains of social reintegration: Family and Friends, Social Interactions, Social Activities, Work and Employment, Romantic Relationships, and Sexual Relationships.[19] Scale scores were standardized to a mean of 50 and SD of 10. Since the Work and Employment scale includes items that investigate the ability of survivors to perform at work as well as their relationships with peers and supervisors at work, only participants who were working at the time of the survey administration completed the Work and Employment domain.

Statistical analysis

Differences in demographic and clinical variables between participants who were and were not injured at work were measured using chi-square tests and *t* tests for categorical and

continuous variables, respectively. Demographic variables included age at time of survey, sex, race/ethnicity, and marital status. Clinical variables included TBSA burned, presence of burns to critical areas, and time since burn injury. With the use of linear regression analyses, scores for each of the 6 LIBRE Profile scales were compared between survivors with and without work-related burn injuries. The analysis for the Work and Employment scale included only participants who were working at the time of survey administration. Models were adjusted for sex, marital status, continuous age at time of survey, continuous TBSA burned, and continuous time since burn injury. Analyses for all scales except the Work and Employment scale also controlled for work status at the time of the interview. Additionally, linear contrasts using *t* tests were performed for item-level data for scales that demonstrated statistically significant differences between those with and without work-related burns in the adjusted regression analyses. Collinearity diagnostics yielded no correlation problems between independent variables. *P* values <.05 were deemed statistically significant.

The study protocol was approved by the Partners Healthcare and Boston University Institutional Review Boards.

Results

A total of 601 burn survivors completed the LIBRE Profile. Six participants were missing information on work-related injury and were excluded from further analyses. The final study sample of 595 individuals had a mean age ± SD of 45±16 years, mean ± SD TBSA burned of 40±24%, and mean ± SD time since injury of 15±16 years. Of the 595 participants, 53% (n=318) were working at the time of survey administration, 16% (n=95) experienced a work-related injury, 45% (n=269) were men, 78% (n=463) were white, and 45% (n=269) were married. Those with work-related injuries were older and more likely to be married and men than those with non—work-related injuries (*P*<.01). Burn size, race/ethnicity, time since burn injury, frequency of burns to critical areas, and current work status did not differ significantly between groups. Complete demographic and clinical characteristics of the population are listed in table 1.

In unadjusted linear regression analyses, burn survivors injured at work scored significantly higher on the Social Interactions scale and significantly lower on the Work and Employment scale compared with those with non—work-related injuries (*P*<.05) (table 2). In adjusted linear regression analyses, those burned at work only exhibited significantly lower Work and Employment scale scores than those not injured at work (*P*=.01) (see table 2). All other scale scores showed no significant differences between groups in adjusted analyses. Post hoc analysis showed that the unadjusted differences in Social Interactions scores were mediated by differences in sex and marital status, whereas adjustment for work status, age at time of survey, TBSA, and time since injury did not substantially change the association between work-related injury and Work and Employment scores. Examining item-level data within the Work and Employment scale, burn survivors with work-related injuries scored significantly worse on 6 of the 19 items (*P*<.05) (table 3). These individuals were more likely to report that they were afraid to go to work and that they felt limited in their ability to perform at work.

Discussion

Compared with burn survivors injured outside of work, those injured at work demonstrated poorer social participation outcomes on 1 of the 6 LIBRE Profile scales: Work and Employment. In addition, those with work-related burn injuries were more likely to report that they were afraid to go to their job and felt limited in their ability to perform at work than those without work-related burn injuries. Return to employment is a key goal of recovery and community reintegration after burn injury. Findings from this study highlight the importance of preparing burn survivors to return to and perform well at work in order to maximize community integration postinjury.

Researchers have begun to investigate long-term outcomes for burn survivors who were injured at work. Several studies[20,21] in other fields have identified a correlation between work-related injuries and poor functional status and satisfaction outcomes at work. One study[22] found that men were almost twice as likely as women to be injured at work, mirroring results from our study. Another study[23] investigating employment rates and barriers to return to work reported that individuals who were burned at work were twice as likely to be unemployed 1 year postinjury compared with those burned outside of work (44% vs 22%). Those injured at work also reported a higher incidence of pain, neurologic symptoms, and psychological issues 1 year postinjury.[23] In addition, burn survivors injured at work who remain unemployed at long-term follow-up report more pain and worse perceived health.[24] Individuals with work-related burns were found to be at elevated risk for developing serious psychiatric symptoms, which are in turn associated with a decreased likelihood of returning to work.[25,26] These prior studies were limited by retrospective study designs, single-center data, and small sample sizes. They focused on the dichotomous variable of return to employment after burn injury as the primary outcome. They do not fully explore the challenges of returning to and functioning at work, and they have not thoroughly examined work reintegration from the perspective of those injured at work. Ours is the first study to evaluate the specific impact of work-related burn injuries on perceived long-term multidimensional community reintegration outcomes for burn survivors.

The psychiatric symptoms noted in these previous studies may explain why those burned at work experience more problems when returning to employment. Evidence suggests that burn survivors experience a high risk of developing posttraumatic stress disorder (PTSD).[27] A comprehensive review[28] of 18 studies of PTSD in burn survivors found rates of 31% to 45% in adults 1 year postinjury. Importantly, many injured workers who develop PTSD are unable to return to work even in the absence of significant physical injuries.[29] According to the latest version of the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition,* PTSD is characterized by several key symptoms: reexperiencing of the event; avoidance of feelings, places, people, or activities related to the event; and increased arousal.[30] If employees are injured at work, any attempts to resume employment will likely remind them of their injury and may trigger intrusive, disturbing thoughts or flashbacks. This may make it difficult to perform at work or may thwart a burn survivor's efforts to return to work entirely. Despite the prevalence of PTSD among burn survivors, its impact on long-term outcomes for those burned at work remains unknown. Additional research is need

to investigate the relationship between PTSD and community integration after work-related burns.

Financial and legal entanglements may also affect a burn survivor's recovery and rehabilitation. Research in other fields has demonstrated that workers' compensation is associated with lower rates of return to work.[31,32] In individuals with traumatic spine fractures and soft tissue low back injuries, receipt of workers' compensation is an established negative predictor of employment.[33] A study[34] of 234 burn survivors who were working before their injury found that those involved in injury-related lawsuits were less likely to return to work. Additionally, workers' compensation insurance follows injured workers only until they return to work. Thus, it is not clear how this insurance status might affect burn survivors once they have returned to work. This lack of follow-up by workers' compensation insurance highlights the paucity of support available to burn survivors at this crucial stage of recovery.

Community participation after burn injury is a socially complex and dynamic process. Our findings show that work reintegration, in particular, is more difficult for those injured at work than for those injured outside of work. Literature on the effects of non—burn-related traumatic injuries has identified the need for effective vocational rehabilitation to facilitate and encourage community reintegration.[35] Previous research[36] with nonburn, work-related injuries has also emphasized that the transition back to work must actively engage managers and coworkers to be successful. These studies have found that open, explicit communication between employees, coworkers, and employers about the worker's condition and potential limitations may contribute to a successful return to work.[36,37] Furthermore, existing literature on pediatric burn survivors demonstrates that educational programs for teachers and peers are beneficial as children return to school, and a recent study provides evidence that there is a need for similar programs for adult burn survivors as they return to work.[38-40]

In order to better understand specific challenges and maximize the benefits of educational programs, further research efforts that follow burn survivors after they regain employment are needed. As the present study shows, individuals with work-related burn injuries have a significantly harder time transitioning back to work, and they are likely to encounter challenges different from those who were burned outside of work. Burn survivors may not be equipped with the knowledge and skills needed to successfully overcome those challenges. A greater understanding of these barriers will enable clinicians to identify more appropriate resources, create more comprehensive plans of care, and implement better targeted interventions for those recovering from work-related burns. In turn, burn survivors who were injured at work may feel better prepared to return to and perform well at work. This information would also be useful for employers and insurance companies, as training to improve communication within the workplace and provide accommodation for injured workers has been shown to reduce injury claims and disability costs.[41]

Study limitations

Several limitations to our study must be noted. The study's cross-sectional design offers a snapshot of burn survivors at one point in time; however, this study included survivors at various time points postinjury, and this was controlled for in the analysis. In addition,

recruitment was carried out on a voluntary basis, and our analyses may be subject to selection bias. Data were collected directly from participants by a self-report questionnaire, and so there is also the potential for a reporting bias regarding clinical characteristics. Additionally, this study did not collect workers' compensation insurance status, and thus any impact that workers' compensation might have on recovery and social reintegration cannot be determined from these data. Finally, while we were able to compare rates of employment and social participation outcomes between burn survivors injured at work and those whose injuries were not work-related, we were unable to compare the 2 groups in terms of rates of return to work, as employment status at the time of injury was not measured in the LIBRE study.

Conclusions

Individuals who were burned at work experienced worse long-term work reintegration outcomes than did those injured outside of work. This association was limited to work and employment outcomes. Compared with burn survivors without work-related injuries, those with work-related injuries reported similar outcomes in the other domains of social participation examined. Identification of those at higher risk for work reintegration challenges, as well as a greater understanding of the barriers faced by these individuals when they do return to work, may enable survivors, providers, employers, and insurers to better use and target appropriate resources to enable optimal employment outcomes.

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List of abbreviations:

LIBRE	Life Impact Burn Recovery Evaluation
PTSD	posttraumatic stress disorder
TBSA	total body surface area

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Table 1

Demographic and clinical characteristics of study population

Characteristic	Work-Related Burn	Non—Work-Related Burn	All Participants
Participants	95 (16)	500 (84)	595 (100)
Age at time of survey (y)*	51±14	43±16	45±16
Sex: male*	75 (79)	194 (39)	269 (45)
Race/ethnicity			
White non-Hispanic	81 (86)	382 (77)	463 (78)
Black or African American	2 (2)	54 (11)	56 (9)
Hispanic/Latino	7 (7)	33 (7)	40 (7)
Other	4 (4)	28 (6)	32 (5)
Married or living with significant other*	70 (74)	199 (40)	269 (45)
TBSA burned (%)	42±24	40±24	40±24
Burns to critical areas	81 (85)	401 (80)	482 (81)
Time since burn injury (y)	14±13	16±17	15±16
Currently working for pay	46 (48)	272 (54)	318 (53)

NOTE. Values are n (%) or mean ± SD. Chi-square tests were performed for each variable to assess differences between participants with and without work-related burns.

*Characteristics differ significantly between the groups, $P<.05$.

Table 2

Linear regression analyses examining the impact of work-related burns on scale scores

	Crude Results			Adjusted Results		
Domain	**B**	**95% CI**	***P***	**B**	**95% CI**	***P***
Sexual Relationships	0.28	−2.58 to 3.14	.85	−0.87	−3.94 to 2.20	.58
Family and Friends	0.98	−1.38 to 3.34	.42	−0.88	−3.37 to 1.61	.49
Social Interactions	2.59	0.35 to 4.83	.02	−0.04	−2.38 to 2.29	.97
Social Activities	−1.20	−3.55 to 1.15	.32	−1.56	−3.91 to 0.79	.19
Romantic Relationships	0.32	−2.36 to 3.00	.81	−1.17	−4.02 to 1.68	.42
Work and Employment*	−3.16	−6.19 to −0.12	.04	−4.28	−7.54 to −1.02	.01

NOTE. Adjusted models include sex, marital status, work status, and continuous age at time of survey, TBSA burned, and time since burn injury. Abbreviation: CI, confidence interval.

*The Work and Employment scale score includes only those who were working at time of survey administration (n=318).

Table 3

LIBRE Profile Work and Employment scale items and examination of items that are statistically different between those with and without work-related injuries

1. Because of how my burns make me look, I find it difficult to complete my work.*
2. I feel that I am disappointing other people at my job.*
3. Compared to others, I am limited in the amount of work I can do.*,†
4. I am afraid to go to my job.*,†
5. Because of my burns I am unable to finish many work tasks.*,†
6. Compared to others, I miss work more often due to health problems related to my burns.*
7. My emotions make it difficult for me to go to work.*
8. My burns have stopped me from learning new things on the job.*,†
9. I cannot find a better job because of my burns.*
10. I am afraid of losing my job because of my burns.*
11. I get tired too quickly at my job.*
12. I get unwanted attention from my coworkers.*
13. I am satisfied with how much I can do at my job.†
14. At my job, I can do everything for work that I want to do.†
15. I am satisfied with my work.
16. I can keep up with my work responsibilities.
17. My boss feels I can do my work.
18. I work well with coworkers.
19. I have enough energy to complete my work.

*Reverse-coded items.

†Items for which burn survivors with work-related injuries scored significantly lower than those with non—work-related burns ($P<.05$).