

Functional Status and Return to Full-Time Work for Adult Hematopoietic Cell Transplantation Survivors

Anne C. Kirchhoff, Karen L. Syrjala

Fred Hutchinson Cancer Research Center, University of Washington School of Public Health and Community Medicine and School of Medicine

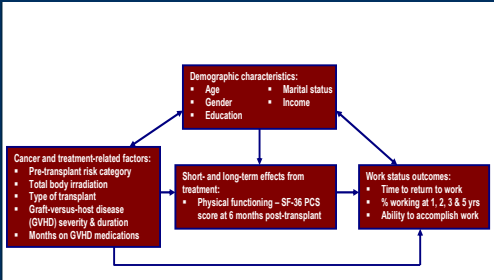
Background

- Although work status plays an important role in the financial stability and sense of normalcy for cancer survivors, medical conditions may limit survivors' ability to return to work.
- Hematopoietic stem cell transplantation (HCT) is used most commonly for leukemia and lymphoma, but also for non-malignancies such as myelodysplasias. Most HCT recipients are under age 60 and have years left to participate in the labor force.
- After HCT, patients report fatigue, cognitive limitations, and other comorbidities. Full recovery can take years or not occur for some.
- Patients receiving stem cells from a related or unrelated donor (allogeneic) instead of their own stem cells (autologous) have complications related to the immunologic reaction of donor cells.
- Chronic graft-versus-host disease (GVHD) occurs in about 60% of allogeneic patients who survive the acute transplant-related toxicities, and can persist for years after HCT.
- These long-term effects can impact a survivor's ability to engage in activities of daily living, such as work. For those who return to work, their ability to accomplish work responsibilities may be diminished.

Aims and Hypotheses

- Primary aim:** We investigated the relationship between 6 month post-transplant functional status on return to full-time work in adult high dose HCT recipients.
 - Hypothesis: Patients who have a Short Form 36 Health Survey (SF-36) physical function component score (PCS) at 6 months greater than 1 SD below the US population norm will return to full-time work less often than patients with better physical functioning scores.
- Secondary aims:**
 - Examine the percent of HCT patients working at 1, 2, 3 and 5 years post-transplant.
 - Examine the self-reported ability to accomplish work among patients who returned to work at 1, 2, and 3 years post transplant.

Conceptual Model of Return to Work after HCT



Methods

- Prospective cohort followed for 5 years after transplant at a medical center specializing in HCT.
- 198 adults primarily with leukemia or lymphoma enrolled before transplant-related treatment; assessments included treatment and demographic factors, date of return to work, and SF-36 at 6 months.
- Binary variable (>40; ≤40) was created from the SF-36 PCS to indicate patients with t-scores 1 SD below the US population norm.
- For return to work we calculated cumulative incidence in the presence of competing risks and ran multivariate Cox proportional hazard regression models to calculate the hazard ratios [HR] and 95% confidence intervals [95% CI] for PCS t-score and other covariates.
- Percent working at 1, 2, 3 and 5 years was calculated.
- For those working, self-report of ability to work was assessed at 1, 2 and 3 years.

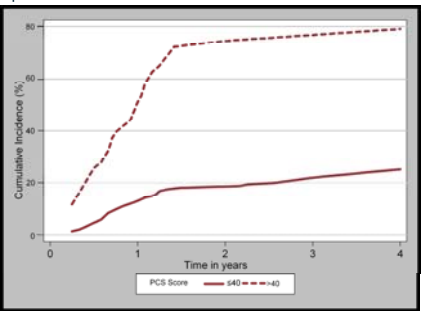
Results

- Of 131 patients working full-time before transplant, 14 (11%) had died and 19 (15%) did not respond to enough questions for PCS calculation at 6 months, leaving 98 patients for the main analysis.
- Patients with PCS scores ≤40 had lower incomes, were higher risk at pre-transplant and were more likely to have chronic GVHD than patients with PCS scores >40 and those with missing scores (Table 1).

TABLE 1: Patient Demographics and Transplant-Related Factors by 6 Month PCS Score			
Demographics	>40 (n=35)	≤40 (n=63)	Missing (n=19) ¹
Age at transplant, years (SD)	41.0 (9.9)	42.6 (8.8)	44.4 (9.2)
Female, %	54	57	58
4 years college or more, %	66	46	37
Married, %	66	68	74
Income ≥ \$45,000/year, %	71	57	79
Transplant-related	>40 (n=35)	≤40 (n=63)	Missing (n=19) ¹
Pre-transplant risk category and disease, %			
Low: CML, chronic phase; Aplastic anemia; MDS (refractory anemia <5% blasts)	51	39	53
Moderate: CML, remission; Diffuse lymphoma, remission; Acute leukemia in remission; CLL; Follicular lymphoma, remission/relapse; MDS (refractory anemia >5% blasts); Breast and ovarian adenocarcinoma, remission	37	40	32
High: CML, blast crisis/relapse; Diffuse lymphoma, relapse; Acute leukemia, relapse; All myeloma; Breast and ovarian adenocarcinoma, relapse	11	22	16
Total body irradiation, %	51	49	58
Transplant type, %			
Autologous	9	19	16
Allogeneic related	40	48	47
Allogeneic unrelated	51	33	37
Chronic GVHD ² - clinical, extensive, %	59	84	75
≥ 12 months on GVHD medication (prednisone), % ²	19	31	19

CML = Chronic myeloid leukemia; MDS = Myelodysplastic syndromes; CLL = Chronic lymphocytic leukemia
¹Patients with no PCS score at 6 months and limited to patients alive at 6 months post-transplant. ²Allogeneic transplant patients only

Figure 1: Cumulative incidence of return to work by 6 month post-transplant PCS score¹



¹Log-rank test of survival curves significant at p=0.001

- Patients with better physical functioning were 2.5 times more likely to return to work; females and patients on GVHD medications for more than 12 months were less likely to return to work (Table 2).

TABLE 2: Hazard Ratios and 95% Confidence Intervals for Return to Work by PCS Score			
N = 98 with complete data	Hazard Ratio ¹	95% CI	p-value
SF-36 PCS score at 6 months			
≤40 (referent)	1.00	—	—
>40	2.54	1.40, 4.60	0.002
Age at transplant			
Male (referent)	0.98	0.94, 1.01	0.15
Female	0.47	0.26, 0.85	0.01
Education			
Less than 4 years college (referent)	1.00	—	—
4 or more years of college	0.76	0.40, 1.41	0.38
Income			
< \$45,000/year (referent)	1.00	—	—
≥ \$45,000/year	1.58	0.70, 3.56	0.37
Married			
Not married (referent)	1.00	—	—
Married	0.91	0.44, 1.85	0.79
Pre-transplant risk category			
Low (referent)	1.00	—	—
Moderate	0.91	0.46, 1.83	0.80
High	1.00	0.42, 2.36	0.99
Transplant type			
Autologous (referent)	1.00	—	—
Allogeneic related/unrelated	0.96	0.32, 2.85	0.94
Chronic GVHD - clinical, extensive			
No (referent)	1.00	—	—
Yes	0.75	0.37, 1.54	0.44
≥ 12 months on GVHD medication (prednisone)			
No (referent)	1.00	—	—
Yes	0.42	0.19, 0.91	0.03

¹Model stratified by pre-transplant total body irradiation status due to violations of the proportional hazards assumption for this variable

- By 5 years, 62 (67%) of all the patients working full-time (N=131) before transplant, who were still alive, had returned to full-time work (Table 3).
- 31-41% of patients working full-time reported limitations in their ability to accomplish work at 1 to 3 years post-transplant (not asked at 5 years).

TABLE 3: Patients Working Full Time After HCT and Report of Limitations in Ability to Accomplish Work				
N (%)	1 year	2 year	3 year	5 year
Number alive at time-point ¹	112 (86)	102 (78)	98 (75)	92 (70)
Currently working full-time ²	39 (35)	54 (53)	56 (57)	62 (67)
If working full-time, are you able to accomplish as much work as before you became sick? ³				
No	16 (41)	17 (31)	20 (36)	Not assessed at 5 years
If no, what percent can you now accomplish at work as compared to before you were sick? ³				
Median	80%	80%	70%	
Range	40-90%	10-90%	20-90%	

¹ Denominator = 131 patients working full-time at pre-transplant. ² Denominator = Number alive at time-point; ³ Denominator = Number working full-time at each time-point

Limitations and Strengths

- Limitations: Potential bias from missing data; small sample size
- Strengths: Few prospective longitudinal studies have examined the relationship between functioning and return to work for HCT recipients, and considered patient's quality of work after transplant.

Conclusions and Implications

- HCT patients with better physical functioning 6 months after transplant are significantly more likely to return to work in the first 5 years after transplant. Both women and patients on GVHD medication for longer than 12 months are less likely to return to work in this time frame.
- At 5 years, 67% of patients who worked before treatment and are still alive returned to full-time work. Between 31-41% report a decreased ability to accomplish their work in the first 3 years after HCT.
- HCT patients may need additional assistance for returning to work, especially those who report physical problems during their acute recovery or ongoing limitations in their ability to accomplish work.

Acknowledgements

This study was supported by National Cancer Institute (NCI) grants CA63030, CA78990, and CA112631. Anne Kirchhoff is funded by the NCI Biobehavioral Cancer Prevention and Control Training Grant 5R25CA052408-07.