graphed ECV—15% total body volume. Patients are on a cardiac monitor and observed during the 3–5 hour treatment. ECP is performed 2 days in a row. Initially, we started every other week and now have moved to starting weekly as we have noticed faster improvement with this schedule. As symptoms improve, ECP schedule is tapered. Seven patients have been treated (median age 13 years (9–28), 4 males/3 females). Median duration of ECP: 11 months (1–26). The procedure is well tolerated with mild symptoms of hypovolemia noted in patients <25 kg. Weight at start of ECP was median 48 kg (22.2–79). Patients <25 kg have received about 1 pRBC transfusion/month. All patients had failed standard therapy with cyclosporine and prednisone in addition to a second- or third-line agent. All were on prednisone at start of treatment. Two patients have renal insufficiency. An attempt to lower prednisone dose and discontinue other immunosuppression was made after stabilization of cGVHD. Three patients expired due to cGVHD complications. Of the remaining 4 patients: 1 is too early to evaluate, all 3 others have responded, of which 2 have discontinued steroid therapy. Response by organ and steroid doses are listed below. All patients remain on a tapered schedule of ECP (every 3 or 4 weeks) since ECP discontinuation led to cGVHD flares in 2, which responded with reinstitution of ECP. The patients with scleroderma and oral sensitivity appear to have had significant benefit from ECP. ECP is feasible in pediatric patients with cGVHD if hct and hydration are carefully maintained at adequate levels for lower-weight patients. ECP appears to be efficacious for refractory cGVHD. Prospective studies are needed to define treatment duration and schedule, and benefits of using ECP concurrently with other immunosuppressants. Finally, we plan on demonstrating feasibility in patients <20 kg using a similar algorithm (Table 1).

Table 1. *Pediatric Patients with Refractory CGVHD Treated with Extracorporeal Photopheresis*

Age (yrs)	Duration (mos)	Symptoms at Diagnosis	Most Recent Symptoms	Intital and Most Recent PDN Dose, mg/kg/d	Line Type	Outcome	Weight at ECP Start (kg)
12	7	Eyes, mouth, skin > 50%*	Eyes-SD. mouth-CR, Skin-PR	2 → 0.6	10F Double Lumen CVL	Dead	28.6
18	20	Liver	Liver-CR	1.6 → 0	10 F single lumen CVL	Alive and Well	48
20	11	Mouth, Skin > 75%, Liver	Mouth-PR, skin-PR, Liver-PD	0.5 → 0.5	9.6 F Vortex Port	Dead	79
11	3	Pulmonary	Pulmonary-PD	1 → 0.5	10 F Double Lumen CVL	Dead	26
28	26	Skin > 50% (Scleroderma)	Skin-PR	1 → 0.25	9.6 F Vortex port	Alive and well	60.6
9	14	Skin > 50% (Scleroderma)	Skin-PR	1 → 0	5 F Yuey PIV Placed Before Each ECP	Alive and Well	22.2
13	1	Liver	Too Early to Evaluate	1 → 0.67	12 F Double Lumen CVL	Alive and Well	61.5

SD = stable disease, CR = complete response, PR = partial response, PD = progressive disease, PDN = prednisone, *%body surface area.

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GRAVES' DISEASE FOLLOWING UNRELATED UMBILICAL CORD BLOOD TRANSPLANTATION IN PEDIATRIC PATIENTS

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Graves' disease (GD) is the most prevalent autoimmune disease in the United States with a peak incidence in the fifth to sixth decades of life and a female to male predominance of ~10:1. In recipients of allogeneic bone marrow and peripheral blood stem cell transplants, GD recurs in previously affected recipients, occurs in unaffected recipients by adoptive transfer of autoimmune thyroiditis from an affected donor, and occurs less frequently in unaffected recipients transplanted with unaffected donors. GD was diagnosed through laboratory surveillance in 3 male pediatric patients ages 5.5–14.3 years, 30–60 months after UCBT. All 3 affected patients received grafts from female donors and were full donor chimeras. None had graft-versus-host disease (GvHD) at diagnosis with GD. Two were transplanted for metabolic diseases (ALD, PNP deficiency) and 1 for ALL. All were conditioned with busulfan/ATG + cyclophosphamide (n = 2) or melphalan (n ≤ 1) and received cyclosporine and methylprednisolone for prophylaxis against GvHD. All were off immunosuppression therapy for >1 year at diagnosis of GD. Treatment with readioactive iodide (n = 2) and Propylthiouracil (n = 1) corrected laboratory abnormalities. The 3 boys were part of a cohort of 265 patients transplanted at our center between 9/1993 and 9/2004, surviving for >1 year post UCBT. Within this group, 55% of the patients had female donors and 45% had male donors. Interestingly, the three cases of GD occurred among the 86 male patients who received female-donor UUCBTs. No cases of GD were seen in female recipients. Neither the donors nor mother of donors developed autoimmune diseases. However, given their young ages, absence of disease does not rule out the possibility of development of this disease several decades into the future.The development of GD in 3 boys after UCBT from female donors is interesting. The etiology of Graves' Disease remains incompletely understood but genetic susceptibility contributes to the development of disease. One affected patient and its donor expressed the GD susceptibility allele, HLA-DRB1*0301, and conversely, a second affected patient and its donor expressed the GD protective allele, DRB1*0701. This could indicate the presence of other immunologic tendencies towards autoimmune disease in the cord blood donor or an alloreactive process from donor or low levels of maternal donor cells contaminating the UCB graft. Further studies will be necessary to determine the etiology of GD in these patients.

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RISK FACTORS FOR DEVELOPMENT OF SYMPTOMS AFTER AUTOLOGOUS TRANSPLANTATION FOR MULTIPLE MYELOMA

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Background: Multiple myeloma (MM) is the most common indication for autografting in the United States. Although safe, autografting can be associated with substantial morbidity due to the toxic side effects of chemotherapy. Strategies aimed at minimizing symptoms post autografting may result in better tolerance. The risk factors for symptom development post autografting for MM have not been well characterized. **Purpose:** To define pretransplant conditions, which may be predictive of post-transplant symptom burden. **Methods:** We performed prospective evaluation of symptom burden among 64 myeloma patients undergoing autograft at MDACC as well as retrospective review of pretransplant variables including patient demographics, performance status, albumin, disease status, and Charlson Comorbidity Index (CCI). Univariate analysis was performed to correlate pretransplant variables with post transplant symptom burden as defined by M. D. Anderson Symptom Inventory (MDASI) scores at different time points post transplant. **Results:** 64 patients were studied from 6/2000 to 5/2003. Symptom burden increased from baseline to day 0 to nadir, with most patients returning to their baseline by day 30 post transplant. Table 1 summarizes the potential impact of pretransplant variables on median MDASI scores at nadir. Patients with the highest MDASI scores at baseline had the highest MDASI scores at nadir in quartile analysis ($P = .001$). Patients with Charlson score of ≥3, age > 60, β2 microglobulin (β2M) > 3, albu-

min ≤ 4, and female gender had a trend towards higher nadir MDASI scores (see Table 1). Other pre-transplant variables, including Durie-Salmon stage, LDH, hemoglobin, disease status at time of autograft, and time from diagnosis to autograft had no apparent correlation with symptom burden throughout transplant (data not shown). **Conclusions:** Autografting for MM is associated with significant but reversible symptom burden during the first 30 days of the procedure. Baseline symptom burden is the most important predictor of post transplant symptom burden. Other potential predictors include Charlson score, age, β2M, albumin, and female gender. The MDASI scoring system is a potentially useful means of following symptom burden post autografting that could be used to assess interventions aimed at reducing transplant related morbidity in MM patients (Table 1).

Table 1. *Impact of Pre-transplant Variables on Nadir MDASI Scores*

	n	Median (range)	*P* value
Charlson score			
<3	**50**	**22 (1–97)**	
≥3	**14**	**41 (3–72)**	**.09**
Age			
≤60	**43**	**23 (1–97)**	
>60	**21**	**31 (3–72)**	**.2**
β2M			
≤ 3.0	**34**	**20 (1–85)**	
>3.0	**27**	**28 (4–97)**	**.2**
Albumin			
≤ 4.0	**50**	**27 (1–97)**	
> 4.0	**14**	**19 (1–60)**	**.2**
Gender			
Female	**26**	**30 (5–85)**	
Male	**38**	**23 (1–97)**	**.2**

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BLOOD AND MARROW TRANSPLANT CAREGIVER ORIENTATION AND RESOURCE FAMILY PROGRAM

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Treatment advances have resulted in a dramatic increase in the number of patients who survive hematological malignancies through blood and marrow transplant, but the psychosocial aspects of transplant and the emotional sequelae for the patient and the family can be devastating. A number of studies have reported significantly increased rates of depression, anxiety, sexual dysfunction, and fatigue among the transplant population (eg, Antin, J., 2002). Our experience has documented the need for a structured program to prepare families for the challenges of the transplant process.

The **BMT Caregiver Orientation and Resource Family Program**. The goals of the Program:

- Help the caregiver to understand the patient's medical/emotional needs.
- Provide information to the caregiver so they can provide adequate care to the patient.
- Assist the caregiver and patient in identifying and utilizing a list of personal resources to help in the care of the patient. Provide support to the caregivers, families, and patients.

BMT Caregiver Program: Each family receives a personalized care manual during a two hour workshop for patients and caregivers. The workshop:

- Details the medical, psychological, and social implications of transplant.
- Introduces them to their transplant team and their Resource Family
- Helps them complete portions of their Family Workbook with medical team present.
- Helps them understand the critical nature of caregiver support and the importance of identifying and ameliorating caregiver fatigue.

Resource Family Program: Resource Families are past transplant patient families that have successfully navigated the rigors of the disease treatment process. These families are educated to work with new transplant patients and their families. Specific ways in which the Resource Families help include:

- Sharing transplant experiences.
- Identifying and understanding stressors caregivers may encounter.
- Introducing techniques to manage the stress of the patient's illness and treatment.

The importance of preparing patients and their caregivers for the care required after transplant cannot be understated and has a direct relationship to the success of the transplant. This program integrates the critical support needs of the caregiver with the patient's ongoing care. Program evaluation has been built into the program to assess effectiveness. The current evaluation data, which includes suggestions for program modifications from transplant families, will be discussed.

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A QUALITY MANAGEMENT PROGRAM'S (QMP) FAVORABLE IMPACT ON A HEMATOPOIETIC STEM CELL TRANSPLANT (HSCT) PRACTICE: THE UNIVERSITY OF KANSAS MEDICAL CENTER EXPERIENCE

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HSCT remains the only curative option for some hematologic disorders. However, it is associated with significant toxicities. The 100-day transplant-related mortality (TRM) may range from 3 to 10% and 20 to 50%, among autologous and allogeneic transplant recipients, respectively. We present the QMP's favorable impact on our institution's stem cell transplant outcomes. QMP reorganization was done pursuant to the Foundation for the Accreditation of Cellular Therapy (FACT) standards. Transplant-related aspects of care were identified and divided into 4 groups: clinical, data management, data collection, and financial. Members were expanded, and active participation from our Infectious Control service was solicited. Monthly audits of indicators from assigned aspect of care were conducted. Outcome analyses of data gathered from 2002 to 2004 were done. Internal and CIBMTR data served as benchmarks. Internal audit(s) revealed infection as the leading cause of early (<30 days) TRM among 9/16 patients who underwent allogeneic transplantation from September 2002 to December 2003, with documented bloodstream infection (BSI) in 55% of the patients. A significant increase in BSI during the fourth quarter of 2004 were noted among patients in the Cancer/HSCT services at 5.22 compared to 1.67/1000 patient days (internal benchmark). *Clostridium difficile* was increased in 2003, especially among HSCT recipients: 11.8 versus 3.6/1,000 pt days in 2002. Working in close collaboration with our Infectious Control service, contributory factors were identified and changes implemented to improve outcomes: construction of additional interventional radiology suite for central venous catheter placement, especially for immunocompromised patients, alteration of dressing change techniques, updating of infection control policies, and hiring of a dedicated transplant nurse practitioner. Follow-up data revealed a decrease of BSI to1.72/1,000 pt days in the first quarter 2005. *C. difficile* incidence trended down to 10/1000 pt days in 2004. The 2003 and 2004 100-day TRM showed significant decrease from 18% to 4% among autologous and 45% to 20% for allogeneic transplant recipients, respectively. Median neutrophil and platelet engraftments were 11.4 and 17 days for autologous transplants, and 16.5 and 21 days for allogeneic transplants, at par with CIBMTR data serving as benchmark. In summary, reorganization of our QMP favorably impacted our transplant practice. A multi-disciplinary approach is essential.