



Complete Summary

GUIDELINE TITLE

The role of cytotoxic therapy with hematopoietic stem cell transplantation in the therapy of multiple myeloma: an evidence-based review.

BIBLIOGRAPHIC SOURCE(S)

Hahn T, Wingard JR, Anderson KC, Bensinger WI, Berenson JR, Brozeit G, Carver JR, Kyle RA, McCarthy PL Jr. The role of cytotoxic therapy with hematopoietic stem cell transplantation in the therapy of multiple myeloma: an evidence-based review. Biol Blood Marrow Transplant 2003 Jan;9(1):4-37. [198 references]
[PubMed](#)

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
QUALIFYING STATEMENTS
IMPLEMENTATION OF THE GUIDELINE
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY
DISCLAIMER

SCOPE

DISEASE/CONDITION(S)

Multiple myeloma

GUIDELINE CATEGORY

Assessment of Therapeutic Effectiveness
Treatment

CLINICAL SPECIALTY

Hematology
Internal Medicine
Oncology
Pathology

INTENDED USERS

Health Plans
Managed Care Organizations
Patients
Physicians

GUIDELINE OBJECTIVE(S)

- To assemble and critically evaluate all of the evidence regarding the role of cytotoxic therapy with hematopoietic stem cell transplantation in the therapy of multiple myeloma
- To make treatment recommendations based on the available evidence
- To identify needed areas of research

TARGET POPULATION

Patients with multiple myeloma who are candidates for hematopoietic stem cell transplantation

INTERVENTIONS AND PRACTICES CONSIDERED

Hematopoietic Stem Cell Transplantation (SCT)

1. Autologous vs. allogeneic
2. Peripheral blood stem cell transplantation (PBSCT) vs. bone marrow transplantation (BMT)
3. Conditioning regimens, such as melphalan without radiation

The Following Types, Techniques, Regimens and Maintenance Therapy were Considered

1. PBSCT using CD34+ selected or unselected stem cells
2. Purging of bone marrow
3. Tandem autologous SCT
4. High-dose sequential regimens
5. Interferon alpha as maintenance therapy post-SCT

MAJOR OUTCOMES CONSIDERED

- Treatment-related mortality
- Overall survival
- Event-free survival
- Progression-free survival
- Clinical and laboratory indicators (e.g., absolute neutrophil count; platelet count)

- Complete response rate
- Cost-effectiveness

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

PubMed, the web site developed by the National Center of Biotechnology Information (NCBI) at the National Library of Medicine of the National Institutes of Health, was searched using the search terms "multiple myeloma" and "transplant." Search results were limited to those studies with human subjects that were published in the English language between January 1, 1980 and June 1, 2002. In addition, search results were excluded if they were not peer-reviewed reports or if they were editorials, letters to the editor, case reports (<10 patients), phase I (dose escalation or dose finding) studies, reviews, consensus conference reports, or practice guidelines, or if they did not focus on an aspect of cytotoxic therapy with stem cell transplantation (SCT) for the treatment of multiple myeloma (MM) (e.g., were reports of renal transplantation due to renal failure in MM patients or otherwise did not focus on an aspect of cytotoxic therapy with SCT for the treatment of MM). Abstracts and presentations at national or international meetings also were not included as evidence in this review due to their lack of formal peer review, their limited availability of details on study design and results, and because they usually are presented as preliminary, not final, analyses of clinical trial data.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Grading the Quality of the Evidence

1

Evidence obtained from at least one properly randomized controlled trial

2-1

Evidence obtained from well-designated, controlled trials without randomization

2-2

Evidence obtained from well-designated, cohort or case-controlled analytic studies, preferably from more than one center or research group

2-3

Evidence obtained from multiple timed series with or without the intervention, or from dramatic results in uncontrolled experiments

3

Opinions of respected authorities based on clinical experience, descriptive studies, or reports of expert committees

4

Evidence inadequate owing to problems of methodology, e.g., sample size, length or comprehensiveness of follow-up, or conflict in evidence

Grading the Strength of the Evidence

1

Experimental therapy significantly better ($P < .05$)

2

Trend in favor of experimental therapy ($P > .05$)

3

No apparent statistical effect

4

Trend favoring control group ($P > .05$)

5

Control group significantly better ($P < .05$)

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Qualitative and Quantitative Grading of the Evidence

Tables 1 to 3 in the original guideline document define criteria used to grade the studies included in the review and the treatment recommendations. Study design, including sample size, patient selection criteria, duration of follow-up, and treatment plan, also was considered in evaluating the studies. All data in the text and tables were abstracted from the original articles first by one author, then were double checked for accuracy and clarity by another author and at least two additional reviewers. In some articles there were discrepancies within the data reported, i.e., the median follow-up reported in the abstract was not the same as the results section or data presented in a table did not agree with those in the text. In these cases, the data most consistent with the text of the article were presented in the review. The first author takes responsibility for any errors that remain. Clinical studies were summarized with enough detail to give a concise summary of study design, sample size, eligibility criteria, treatment schedule, duration of follow-up, and outcomes measured. Subjective statements, such as short versus adequate versus long follow-up, small versus large sample size, and improper or inappropriate study design, were not used so that the reader is not biased by the authors' opinions.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Treatment recommendations, based on the evidence presented in the review, were made unanimously by a panel of multiple myeloma experts.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Grading the Strength of the Treatment Recommendation

1

Effective treatment

2

Marginally effective treatment

3

Not an effective treatment

4

Equivalent treatments (no statistical or clinical difference between therapies)

5

Inadequately evaluated treatment and recommended for comparative study

6

Inadequately evaluated treatment but not recommended for comparative study

COST ANALYSIS

Stem Cell Transplantation Economic/Cost-Effectiveness Studies

The guideline developer reviewed a number of published cost analysis studies.

One group of researchers performed a prospective, non-randomized, population-based, multicenter study of 274 patients with multiple myeloma (MM) comparing autologous peripheral blood stem cell transplantation (PBSCT) with melphalan (MEL) conditioning and interferon alpha (IFNa) maintenance with 274 historical controls pooled from 5 randomized trials of conventional chemotherapy, as previously described. Additional researchers reported a companion study that collected data on costs, resource consumption, and health-related quality-of-life (HRQoL) at baseline and during periodic follow-up of the prospective trial; the same method had been used in one of the historical trials including patients treated with melphalan and prednisone (MP) for induction (n=70). In the PBSCT group, 221 patients (78%) participated in the HRQoL study, of whom 201 patients (73%) completed all questionnaires. In the MP group, 66 patients (94%) participated and 61 patients (87%) completed all questionnaires. Quality-adjusted life-years (QALYs) were calculated with the assumption of a mean 1.5-year gain in survival at the cost of a 6-month reduction in the HRQoL.

The PBSCT group had significantly prolonged median overall survival (OS) compared with the MP group (62 versus 44 months). In the PBSCT group, resource consumption included medical costs, hospital stay (including intensive care unit days), personnel costs (physicians and nurses), leukapheresis, and transfusions, and involved a cost of \$24,400 (all costs are in year 2000 United States [US] dollars). Indirect costs measuring lost production (estimate of 104 days of lost unpaid employment per person) were estimated at \$7,900, for a total societal cost per PBSCT patient of \$32,300. The cost-utility ratio for PBSCT over MP was \$27,000 per QALY, and by sensitivity analysis ranged from \$20,200 to \$40,000 per QALY.

Another group of researchers retrospectively calculated the treatment costs of 26 patients with MM who received MEL (n=11) or MEL plus granulocyte-colony stimulating factor (G-CSF) (n=7) compared with autologous transplantation with G-CSF mobilized peripheral blood stem cell (PBSC) re-infused after MEL (n=8). Costs included hospital days (personnel, supplies, medical services, and overhead), diagnostics, pharmacy, laboratory, insertion of central venous catheters, and transfusions. The PBSCT group had significantly lower costs for hospital days (US \$7,335 versus \$16,747; P<0.005), antibiotics (\$2,454 versus \$6,476; P<0.01), parenteral nutrition (\$229 versus \$2,148; P<0.001), transfusions (\$1,065 versus \$2,762; P<0.05), and total treatment costs (\$17,908

versus \$32,223; $P < 0.005$) compared with the MEL +/-G-CSF group. The PBSCT group had significantly higher costs for G-CSF (\$5,293 versus \$1,393; $P < 0.01$) compared with the MEL +/-G-CSF group. The article does not state what calendar year the costs in US dollars represent, although the article was submitted to the journal in 1993.

Analysts retrospectively compared the survival, quality of life, and therapy costs of 12 patients with MM stage III treated with MEL as induction and mobilization, PBSC collections, and autologous transplantation (group 1) with 10 patients with similar characteristics but treated with conventional chemotherapy (group 2) with 15 patients with MM stage II treated with conventional chemotherapy (group 3). The conventional chemotherapy regimen consisted of at least 6 cycles of either VAD (Vincristine [continuous infusion for 4 days], Adriamycin [continuous infusion for 4 days], and dexamethasone [orally, varying schedules]) or M2 (BCNU, eldisine, Cy, and MEL); the conditioning regimen was MEL (140 mg/m²) plus total body irradiation (TBI). Group 1 patients did not receive any maintenance therapy post-PBSCT; they were treated at time of relapse with one of the conventional chemotherapy regimens listed above or with subcutaneous IFNa plus pulse dexamethasone. Group 2 patients surviving at 6 months post-induction therapy received maintenance therapy with the regimen they did not initially receive (VAD or M2). Group 3 patients were treated with MP as maintenance therapy in case of disease response and conventional chemotherapy in case of disease progression.

The average total costs (all in 1993 US dollars) for each group including all therapy as defined above was significantly higher in group 1 (\$56,700) versus group 2 (\$46,555; $P < 0.05$) versus group 3 (\$37,430; $P < 0.02$). The average total costs of therapy based on mean survival duration in group 1 was significantly lower (\$350/wk) compared with group 2 (\$1,862/wk; $P < 0.0001$) but significantly higher than group 3 (\$225/wk; $P < 0.05$). When these values were adjusted for quality of life, group 1 cost \$74/wk more than group 2 and \$966/wk more than group 3.

A cost-minimization analysis was performed of 51 patients with MM comparing autologous bone marrow transplant (BMT) (n=14) versus PBSCT (n=37). All patients received induction therapy with VAMP (vincristine, Adriamycin, and methylprednisolone), C-VAMP (cyclophosphamide, vincristine, Adriamycin, and methylprednisolone), or verapamil, Cy (cyclophosphamide), vincristine, adriamycin, and methylprednisolone (VC-VAMP) followed by MEL (200 mg/m²) and infusion of either bone marrow (BM) or PBSC. The PBSCT group had a significantly faster time to neutrophil engraftment (16 versus 22 days; $P = 0.0019$) and time to platelet recovery (19 versus 27 days; $P = 0.0019$), which resulted in a shorter duration of intravenous antibiotics (12 versus 19 days; $P < 0.0001$), reduced number of platelet transfusions (12 versus 31.5 units; $P = 0.0005$), and shorter hospital length of stay (19 versus 27.5 days; $P < 0.0001$). The total cost of PBSCT was 27.5% less than autologous BMT (actual costs are stated in British pounds with no conversion to US dollars and no calendar year indicated).

In another study, 91 patients with MM who received a total of 118 transplants as outpatients were compared with 160 patients with MM who received 218 transplants as inpatients. Patients treated as outpatients were younger, had a higher percentage of CD34+ cells in the apheresis product, and were more likely to have a normal serum albumin level, low B2M (Beta₂-microglobulin) level, and

chemotherapy-sensitive disease than inpatients. There was no significant difference in the hematologic recovery between inpatients and outpatients. Twenty-one percent of patients who underwent outpatient transplantations required admission after transplantation for nausea, vomiting, diarrhea requiring parenteral alimentation and/or severe mucositis requiring narcotic analgesics (28%), bacteremia or pneumonia (28%), febrile neutropenia and gastrointestinal toxicity (24%), persistent fever for more than 3 days (12%), or were admitted at the discretion of the physician (8%). B2M >2.5 mg/L was the only significant risk factor for hospital admission in the outpatient transplant group (58% versus 24%; $P < 0.001$). Median hospital length of stay was 9 days for outpatients versus 15 days for inpatients ($P = 0.0001$).

Total charge for the transplantation procedures included physician, hospital, and clinic charges. A multivariate analysis assessing age, gender, prior response to therapy, time from diagnosis to first transplantation, immunoglobulin (Ig) isotype, disease stage, number of CD34+ cells infused, serum creatinine, albumin, B2M, and lactate dehydrogenase (LDH) was performed to identify factors associated with savings. Outpatient transplantation was the only factor associated with savings. Total average adjusted charges were \$13,172 (1994 US dollars) lower for outpatients compared with inpatients. Specifically, outpatients had lower hospitalization charges (50% of overall savings), pharmacy charges (42%), and pathology/laboratory charges (37%). Outpatients had higher miscellaneous charges (-30% of overall savings) including housing and caregiver costs.

The treatment and follow-up costs were calculated in a retrospective study of 29 patients with newly diagnosed MM. Costs included those for hospitalization, outpatient visits, laboratory, pharmacy, pathology, imaging (X-rays, computed tomography, etc.), apheresis, transfusions, insertion of central venous catheters, personnel, supplies, medical equipment, and overhead. All prices are stated in 1995 US dollars. Each patient was scheduled to be treated and followed in 8 phases (mean cost for each phase and number of patients completing that phase): VAD or VAMP induction (\$8,400; $n = 29$), follow-up I (\$425; $n = 29$), MEL plus whole blood rescue (\$11,000; $n = 29$), follow-up II (\$1,825; $n = 26$; 3 patients died during this phase), PBSC collections (\$9,350; $n = 21$), follow-up III (\$1,250; $n = 17$; 1 patient died during this phase), autologous PBSCT with busulfan plus Cy conditioning (\$15,125; $n = 15$; 2 patients died during this phase), and follow-up intravenous (IV) until 3 months post-hospital discharge after PBSCT (\$2,400; $n = 13$). The total mean costs of treatment and follow-up for the 13 patients who completed the program as scheduled was \$44,800 and for the 16 who did not complete the entire program or who required additional therapy was \$57,025.

A meta-analysis of 5 clinical trials published between 1993 and 1996 with at least 100 patients with newly diagnosed untreated MM per treatment arm was conducted, and the cost-effectiveness ratio was determined. The trials included 4 comparing MP +/- IFNa and one comparing autologous BMT versus conventional chemotherapy. Survival data were abstracted and pooled (where more than 1 trial evaluated the treatment) from the published trial data and used to calculate the mean lifetime survival (MLS) for each therapy. Costs also were abstracted from the published literature of autologous transplantation and estimated at \$60,000 (1995 US\$) per patient, however a sensitivity analysis of the transplantation cost data used the range of \$20,000 to \$120,000 as the most extreme published values. Four of the clinical trials published cost data on MP as induction therapy,

which averaged \$2,700 per patient; no sensitivity analysis was performed for MP because of the high precision of these data.

The pooled MLS values for the MP versus MP plus IFNa were not significantly different (3.47 versus 3.74 years; $P > 0.05$). Autologous BMT had a significantly longer survival than the MP group (MLS 7.28 years; $P < 0.05$). The cost-effectiveness ratio was calculated by dividing the difference in costs between MP and BMT by the difference in life years gained (LYG) per patient. Using the \$60,000 estimate for BMT, the cost per LYG (cost-effectiveness ratio [CER]) was \$25,710 and ranged from \$7,773 to \$52,616 by the sensitivity analysis.

Another group of researchers identified from the literature 1 randomized controlled trial and 2 case series of high-dose therapy with autologous SCT versus conventional-dose chemotherapy as first-line treatment of MM. Examined outcomes were LYG and event-free LYG. Cost estimates for SCT were based on out-of-area treatment costs for Central Sheffield University Hospitals and included costs for mobilization, stem cell harvest, 3-week inpatient hospital stay, outpatient follow-up, and pharmacy costs. The overall average treatment cost for SCT was £12,460 per patient. Cost estimates for conventional chemotherapy were based on the pharmacy costs of 6 to 9 courses of ABCM (Adriamycin, BCNU, cyclophosphamide, and MEL) and additional outpatient visit costs, yielding an average treatment cost of £1,980 per patient. The randomized trial data resulted in a mean 5-year survival benefit of 0.7 LYG for SCT patients, an additional 0.7 event-free LYG for SCT patients, and a CER of £14,970 per LYG. A sensitivity analysis using the case series data with information on 10-year survival rates determined the survival benefit to be 1.7 LYG and a CER of £6,160 per LYG. Fitting a mathematical Weibull curve to the survival data points yielded a 10-year survival benefit of 2.3 LYG, a CER of £4,553 per LYG, and a 20-year survival benefit of 3.8 LYG.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The American Society for Blood and Marrow Transplantation (ASBMT) grades its recommendations (1-6) and the quality of the supporting evidence (1-4). The definitions of these grades can be found at the end of the "Major Recommendations" field.

Recommendations for stem cell transplantation (SCT) as an effective therapy for multiple myeloma (MM) include the following:

- SCT is preferred to standard chemotherapy as de novo therapy.

- SCT is preferred as de novo rather than salvage therapy.
- Autologous peripheral blood stem cell transplantation (PBSCT) is preferred to bone marrow transplantation (BMT).
- Melphalan is preferred to melphalan plus total body irradiation as the conditioning regimen for autologous SCT.

Recommendations that SCT is not effective include the following:

Current purging techniques of bone marrow

Recommendations of equivalence include the following:

PBSCT using CD34+ selected or unselected stem cells.

No recommendation is made for indications or transplantation techniques that have not been adequately studied, including the following:

- SCT versus standard chemotherapy as salvage therapy
- Tandem autologous SCT
- Autologous or allogeneic SCT as a high-dose sequential regimen
- Allogeneic BMT versus PBSCT
- A preferred allogeneic myeloablative or nonmyeloablative conditioning regimen
- Maintenance therapy post-autologous SCT with interferon alpha post-SCT

Table. Summary of Treatment Recommendations Made by the Expert Panel for Multiple Myeloma

Indication for SCT	Treatment Recommendation	Highest Level of Evidence	Reference*	Comments
SCT vs. standard chemotherapy as de novo therapy	1	1	Attal et al., 1996	Ongoing trials may change the recommendation.
SCT vs. standard chemotherapy as salvage therapy	5	2	Alexanian et al., 1994	There is only 1 non-randomized study that applies.
SCT as de novo vs. salvage therapy	2	1	Fermand et al., 1998	These are equivalent in terms of overall survival, however, SCT as de novo is preferred because it may avoid the

Indication for SCT	Treatment Recommendation	Highest Level of Evidence	Reference*	Comments
				inconvenience, cost, and risk of myelodysplasia from conventional alkylating agent therapy.
Autologous vs. allogeneic SCT	2	2	Lokhorst et al., 1999; Seiden et al., 1995; Anderson et al., 1993; Anderson et al., 1991; Björkstrand et al., 1996; Varterasian et al., 1997; Reynolds et al., 2001; Couban et al., 1997	Autologous SCT is recommended over a meylablative allogeneic SCT.
Autologous PBSCT vs. BMT	1	2, 3	Raje et al., 1997; Harousseau et al., 1995	PBSCT is preferred based on level 2 evidence regarding engraftment, not survival, outcomes. PBSCT is also the accepted standard based on expert opinion.
Autologous CD34+ selected vs. unselected PBSCT	4	1	Stewart et al., 2001; Vescio et al., 1999	
Autologous purged BMT	3	2	Reece et al., 1993; Lemoli et	

Indication for SCT	Treatment Recommendation	Highest Level of Evidence	Reference*	Comments
			al., 1999; Rasmussen et al., 2002; Barbui et al., 2002	
Tandem autologous PBSCT	6	4		A level 1 evidence study has been conducted and will soon be published to address this critical question.
Preferred autologous SCT myeloablative conditioning regimen	1	1	Moreau et al., 2002	Mel is preferred to Mel plus TBI based on toxicity not efficacy, however, there is no level 1 evidence comparing Mel or Mel plus TBI with other conditioning regimens (eg, BuCy, BuMelTt).
Autologous high-dose sequential regimen	6	4	Palumbo et al., 2000; Palumbo et al., 1997	
Allogeneic BMT vs. PBSCT	6	2	Gahrton et al., 2001	
Preferred allogeneic SCT myeloablative conditioning regimen	5	4	Cavo et al., 1998	There is only 1 feasibility study with a small sample size and no comparison group.
Allogeneic SCT nonmyeloablative regimen	5	4	Badros et al., 2002	There is only 1 feasibility study with a small

Indication for SCT	Treatment Recommendation	Highest Level of Evidence	Reference*	Comments
				sample size and no comparison group.
Allogeneic high-dose sequential regimen	6			No evidence.
Autologous SCT followed by allogeneic SCT	5			No evidence published. A study is in progress to address this question.
Maintenance therapy post-autologous SCT with IFNa vs. none	5	4	Cunningham et al., 1998	Early survival advantage (4-5 y) that is lost over time; problems with study methodology.
Maintenance therapy post-autologous SCT with IFNa vs. other therapies (i.e., corticosteroids, thalidomide, or its derivatives)	5			No evidence.

*The references listed represent the highest level of evidence used to make the treatment recommendation and are not inclusive of all evidence described in the review.

Abbreviations: SCT, stem cell transplantation; PBSCT, peripheral blood stem cell transplantation; BMT, bone marrow transplantation; Mel, melphalan; TBI, total body irradiation; IFNa, interferon alpha

Definitions:

Grading the Strength of the Treatment Recommendations

1

Effective treatment

2

Marginally effective treatment

3

Not an effective treatment

4

Equivalent treatments (no statistical or clinical difference between therapies)

5

Inadequately evaluated treatment and recommended for comparative study

6

Inadequately evaluated treatment but not recommended for comparative study

Grading the Quality of the Evidence

1

Evidence obtained from at least one properly randomized controlled trial

2-1

Evidence obtained from well-designated, controlled trials without randomization

2-2

Evidence obtained from well-designated, cohort or case-controlled analytic studies, preferably from more than one center or research group

2-3

Evidence obtained from multiple timed series with or without the intervention, or from dramatic results in uncontrolled experiments

3

Opinions of respected authorities based on clinical experience, descriptive studies, or reports of expert committees

4

Evidence inadequate owing to problems of methodology, e.g., sample size, length or comprehensiveness of follow-up, or conflict in evidence

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

[References open in a new window](#)

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The treatment recommendations are based on the results of well-planned, scientifically sound, peer-reviewed clinical trials. Refer to the "Major Recommendations" field for the specific type of evidence supporting these recommendations.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Evidence-based and cost-effective use of stem cell transplantation in the treatment of patients with multiple myeloma.
- Stem cell transplantation (SCT) is more effective than conventional chemotherapy as a first-line therapy. In addition, SCT may avoid the risks and costs of myelodysplasia associated with conventional alkylating agent therapy.
- Patients treated with SCT may go on to live productive lives, sometimes for decades after diagnosis and treatment.

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

There are limitations to any evidence-based review of the published literature. The criteria for this review included reliance only on published data, specifically peer-reviewed articles published since 1980. Unpublished data, which were not included in the review, usually represent "negative" findings and usually do not undergo peer review. The guideline developers also excluded data published only in abstract form because they are usually not peer-reviewed and are presented in an abbreviated format. Another limitation of this review is its reliance on published data rather than individual patient data. The stated goal of this review

was to present evidence for making recommendations regarding the role of stem cell transplantation in the therapy of multiple myeloma. Time and financial constraints made it impractical to obtain data on individual patients from the large number of clinical trials included in this review. Although it was not the objective of this review to perform an extensive meta-analysis of individual patient data, such an analysis is warranted to further clarify the results of studies and address unanswered questions.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Hahn T, Wingard JR, Anderson KC, Bensinger WI, Berenson JR, Brozeit G, Carver JR, Kyle RA, McCarthy PL Jr. The role of cytotoxic therapy with hematopoietic stem cell transplantation in the therapy of multiple myeloma: an evidence-based review. *Biol Blood Marrow Transplant* 2003 Jan;9(1):4-37. [198 references]
[PubMed](#)

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2003 Jan

GUIDELINE DEVELOPER(S)

American Society for Blood and Marrow Transplantation - Professional Association

SOURCE(S) OF FUNDING

American Society for Blood and Marrow Transplantation (ASBMT)

GUIDELINE COMMITTEE

Multiple Myeloma Expert Panel

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Guideline Authors: Theresa Hahn (Roswell Park Cancer Institute, Buffalo, New York); John R. Wingard (University of Florida College of Medicine, Gainesville, Florida); Kenneth C. Anderson (Dana-Farber Cancer Institute, Harvard Medical School, Boston, Massachusetts); William I. Bensinger (The Fred Hutchinson Cancer Research Center, Seattle, Washington); James R. Berenson (Cedars Sinai Medical Center, Los Angeles, California); Greg Brozeit (International Myeloma Foundation, North Hollywood, California); Joseph R. Carver (Abramson Cancer Research Institute, University of Pennsylvania, Philadelphia, Pennsylvania); Robert A. Kyle (Mayo Clinic, Rochester, Minnesota); Philip L. McCarthy, Jr. (Roswell Park Cancer Institute, Buffalo, New York)

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [American Society for Blood and Marrow Transplantation \(ASBMT\) Web site](#).

Print copies: Available from the American Society for Blood and Marrow Transplantation, 85 W. Algonquin Road, Suite 550, Arlington Heights, IL 60005; Phone: (847) 427-0224; Fax: (847) 427-9656; E-mail: mail@asbmt.org.

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on November 18, 2003. The information was verified by the guideline developer on December 19, 2003.

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