



PEDIATRIC BLOOD AND MARROW TRANSPLANT PROGRAM

DOCUMENT NUMBER: PBMT-GEN-022

DOCUMENT TITLE:

Total Body Irradiation

DOCUMENT NOTES:

Document Information

Revision: 07

Vault: PBMT-General-rel

Status: Release

Document Type: PBMT

Date Information

Creation Date: 18 Sep 2020

Release Date: 15 Oct 2020

Effective Date: 15 Oct 2020

Expiration Date:

Control Information

Author: MOORE171

Owner: MOORE171

Previous Number: PBMT-GEN-022 Rev 06

Change Number: PBMT-CCR-306

PBMT-GEN-022 TOTAL BODY IRRADIATION

1 PURPOSE

- 1.1 To outline the procedure and nursing responsibilities for Total Body Irradiation (TBI).

2 INTRODUCTION

- 2.1 TBI is the use of high-energy ionizing radiation over the body. The radiation causes the breakage of one or both strands of the DNA (deoxyribonucleic acid) molecule inside the cells, thereby preventing their ability to replicate.
- 2.2 The goal of TBI is to:
 - 2.2.1 To suppress the patient's immune system and prevent rejection of donor bone marrow after a bone marrow transplant using donor marrow/cord blood.
 - 2.2.2 To kill abnormal cells that escape other therapies such as surgery, chemotherapy, or local irradiation and remain hidden in the body to regrow later.
 - 2.2.3 The dose of radiation administered is determined by the radiation oncologist, based upon a number of factors, including at a minimum the radio sensitivity of the tumor, the normal tissue tolerance, and the volume of tissue to be irradiated, prior radiation exposure, and any factors that may increase the toxicity of radiation.
 - 2.2.4 The Gray, the System Internationale Unit, is the accepted term for radiation dosage.
 - 2.2.5 Treatments are typically given on a twice daily basis for 4 days as ordered by the radiation oncologist physician. However, doses may be reduced in certain settings, such as non-myeloablative regimens and specific requirements of the patient.
 - 2.2.6 TBI is typically done on an outpatient basis, if tolerated. Inpatient admission may be required for patients with refractory nausea, vomiting or other complications that cannot be managed on an outpatient basis.

3 SCOPE AND RESPOSIBILITIES

- 3.1 This procedure applies to all healthcare providers of the patient receiving TBI during and around the radiation treatment.
- 3.2 Interdisciplinary
 - 3.2.1 Radiation Oncologists, Pediatric Blood and Marrow Transplant (PBMT) Physicians, Advanced Practice Providers, Radiation Oncology Nurses, Clinic and Inpatient Nurses, and Child Life Specialists responsible for the care of the patient receiving TBI have roles in carrying out the contents of this procedure.

- 3.2.2 The radiation oncologist will have access to patient diagnosis and co-morbid conditions via the electronic health record. Following review and consultation with PBMT physician, he/she will order the radiation treatments. The radiation oncologist will document a summary of plans for and actual treatment with radiation in the patient chart as per radiation therapy standards.
- 3.2.3 The radiation oncology nurses will assist the patient receiving TBI.
- 3.2.4 The PBMT physician will provide supportive medical management of the patient receiving TBI.
- 3.2.5 The clinic and inpatient nurses will provide supportive care to the patient receiving TBI.
- 3.2.6 The child life specialist will provide emotional support to the patient undergoing TBI.

4 DEFINITIONS/ACRONYMS

- 4.1 CHG Chlorhexidine gluconate
- 4.2 DNA Deoxyribonucleic acid
- 4.3 PBMT Pediatric Blood and Marrow Transplant
- 4.4 TBI Total Body Irradiation

5 MATERIALS

- 5.1 NA

6 EQUIPMENT

- 6.1 NA

7 SAFETY

- 7.1 NA

8 PROCEDURE

8.1 Side Effects:

8.1.1 Side effects from TBI include, but are not limited to:

- 8.1.1.1 Acute: Side effects that occur during or within 6 months of treatment. These include skin breakdown, nausea and vomiting, parotiditis, bone marrow suppression, pneumonitis, hair loss, stomatitis, xerostomia, esophagitis, cystitis, diarrhea, ulceration and pain. Additional side effects may include taste changes and infection. Somnolence syndrome is a low and transient risk.
- 8.1.1.2 Chronic: Side effects that occur more than 6 months following treatment. These include skin fibrosis, taste alterations, permanent hair loss, pulmonary fibrosis, bladder

fibrosis, alterations in growth and development, and radiation nephritis. Additional potential side effects include: cognitive impairment, secondary malignancies, and hormonal changes, including infertility.

8.2 Patient Monitoring:

8.2.1 Skin

- 8.2.1.1 Assess skin within the treatment area for erythema, pain, and dry or moist desquamation.
- 8.2.1.2 Wash the treatment area only with tepid water and a soft wash cloth.
- 8.2.1.3 Avoid the use of soaps, chlorhexidine gluconate (CHG) wipes, deodorants, powders, perfumes, cosmetics, heavily scented lotions, and skin preparations.
- 8.2.1.4 Wear cotton clothing next to the skin.
- 8.2.1.5 Protect the area from the sun.
- 8.2.1.6 Note: Any marking(s) on the patient's skin for treatment purposes must not be removed unless otherwise instructed by radiation oncologist.

8.2.2 Emesis

- 8.2.2.1 Assess for nausea and emesis each shift and as needed
- 8.2.2.2 Patient should receive scheduled anti-emetics as ordered.

8.2.3 Diarrhea

- 8.2.3.1 Chart strict intake and output. Assess for diarrhea.
- 8.2.3.2 Utilize low residue diet when diarrhea occurs.
- 8.2.3.3 Monitor hydration status daily and as needed.
- 8.2.3.4 Assess perianal area for excoriation daily and as needed.

8.2.4 Anorexia

- 8.2.4.1 All patients will receive a nutrition consult
- 8.2.4.2 Assess nutritional status, food intake, and weight.
- 8.2.4.3 Suggest small, frequent meals, high-protein and high-calorie foods and snacks.

8.2.5 Stomatitis, Pharyngitis and Esophagitis

- 8.2.5.1 Assess oral cavity daily and as needed.
- 8.2.5.2 Follow mouth care per unit routine and as ordered.
- 8.2.5.3 Utilize topical anesthetics or analgesics as ordered to minimize pain.

8.2.6 Xerostomia

8.2.6.1 Daily Assess for xerostomia and inspect oral cavity for signs of infection and as needed.

8.2.6.2 Provide soft and moistened foods.

8.2.6.3 Use saliva substitutes as ordered.

8.2.7 Fatigue

8.2.7.1 Assess level of fatigue every day and as needed.

8.2.7.2 Determine activities that increase fatigue and encourage activities that reserve energy.

8.2.7.3 Assure satisfactory nutritional status.

8.2.8 Pulmonary

8.2.8.1 Assess respiratory status every shift and as needed or if changes occur.

8.2.8.2 Obtain chest X-Ray as ordered.

8.2.8.3 Obtain pulse oximetry as ordered.

8.2.8.4 Administer antibiotics as ordered.

8.2.9 Cystitis

8.2.9.1 Assess for cystitis, dysuria, and frequency daily and as needed.

8.2.9.2 Assess for bladder infection daily and as needed.

8.2.9.3 Encourage fluid intake.

8.2.9.4 Chart strict intake and output.

8.3 Documentation:

8.3.1 Document patient assessment in the electronic medical record.

8.3.2 Educate patient and family, and document according to hospital policy.

9 RELATED DOCUMENTS/FORMS

9.1 NA

10 REFERENCES

10.1 NA

11 REVISION HISTORY

Revision No.	Author	Description of Change(s)
07	S. McCollum	<ul style="list-style-type: none">- Acronyms defined throughout- Section 8.1 acute: parotiditis added- Section 8.1 chronic: hormonal changes added- Section 8.1 chronic: secondary malignancy added- Section 8.2: Reordered to group like items together; skin and emesis first in listing at request of radiation oncology team.- Section 8.2: Emesis section added.

Signature Manifest**Document Number:** PBMT-GEN-022**Revision:** 07**Title:** Total Body Irradiation**Effective Date:** 15 Oct 2020

All dates and times are in Eastern Time.

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