Provincial Clinical Knowledge Topic

BEAM +/- R, Adult BMT - Inpatient

V 1.0

Revision History

Version	Date of Revision	Description of Revision	Revised By
1.0	December 27, 2018	Topic Completed	See Acknowledgments

Important Information Before you Begin

The recommendations contained in this knowledge topic have been provincially adjudicated and are based on best practice and available evidence. Clinicians applying these recommendations should, in consultation with the patient, use independent medical judgment in the context of individual clinical circumstances to direct care. This knowledge topic will be reviewed periodically and updated as best practice evidence and practice change.

The information in this topic strives to adhere to Institute for Safe Medication Practices (ISMP) safety standards and align with Quality and Safety initiatives and accreditation requirements such as the Required Organizational Practices. Some examples of these initiatives or groups are: Health Quality Council Alberta (HQCA), Choosing Wisely campaign, Safer Healthcare Now campaign etc.

Guidelines

This topic is based on the following guideline(s): Alberta Blood and Marrow Transplant Program (ABMTP) Standard Practice Manual

Please refer to ABMTP Standard Practice Manual for more information and recommendations about this topic.

Keywords

Topic Name: BEAM +/- R, Adult BMT - Inpatient

- Alberta Blood and Marrow Transplant Program (ABMTP)
- Blood and Marrow Transplant (BMT)
- Stem Cell Transplant
- Autologous Transplant
- Conditioning
- Stem Cell Transplant
- Rituximab (R)

Guides:

- Order set should include access to the ABMTP Standard Practice Manual

References:

- Reference in other order groups as indicated in each protocol once developed
  - Stem Cell Infusion - Autologous
- *Rituximab IV/SC One-Time Dose Order Panel - Inpatient:* All orders are to be defaulted to the protocol day identified above the order panel or appropriately aligned with this protocol day as specified within the individual orders
- Advanced Order Groups:
  - *Rituximab IV/SUBCUT One-Time Dose Order Set - Inpatient:* Rituximab **option #1 Rituximab – Intravenous** to be default order option with **option #2 – Rituximab – Subcutaneous** as Advanced Order Group

Alberta Health Services

BEAM +/- R, Adult BMT Inpatient Order Set

Order Set Keywords: etoposide, VP16, melphalan, rituximab, ritux, autologous, conditioning, bone marrow transplant, blood and marrow transplant, BMT, carmustine, BCNU, cytarabine, ARA-C

Order Set Requirements

Most recent:

- Height _____ cm
- Weight
  - actual _____ kg
  - ideal _____ kg
  - adjusted _____ kg *(40% of difference between ideal and actual)*
- BSA _____ m^2
- Estimated Creatinine Clearance (CrCl) _____
- Bilirubin and creatinine lab results

Link patient weight with recommended dose of filgrastim

- For patient weighing less than 60 kg: filgrastim 300 mcg IV/SUBCUT daily
- For patient weighing 60 – 90 kg: filgrastim 480 mcg IV/SUBCUT daily
- For patient weighing more than 90 kg: filgrastim 600 mcg IV/SUBCUT daily

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Indication

Conditioning for Autologous Stem Cell Transplant

Treatment Cycle and Dates

Stem Cell Infusion date: Day 0 _____ (*dd-Mon-yyyy*)

Protocol Summary:

Protocol DAY -6

riTUXimab 375 mg/m^2/dose IV or riTUXimab 1400 mg SUBCUT ***(if required)***

carmustine 300 mg/m^2/dose

Protocol DAYS -5, -4, -3, -2

etoposide 100 mg/m^2/dose *Note: Total daily dose 200 mg/m^2/day*

cytarabine 200 mg/m^2/dose *Note: Total daily dose 400 mg/m^2/day*

Protocol DAY -1

melphalan 140 mg/m^2 (adjusted)/dose

Protocol DAY 0

Autologous Stem Cell Infusion
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~*Start of Order Panel~ BMT Laboratory Investigation – ONCE - Inpatient*

**BMT Laboratory Investigation – ONCE - Inpatient

Keywords: Admission, labs, one time

ONCE – Day of Admission/Pre-Treatment - STAT

☐ Unit to Collect ☐ Lab to Collect

Hematology

☑ Complete Blood Count (CBC) with Differential
☑ PTT
☑ PT (INR)
☐ Retic count

Chemistry

☑ Electrolytes (Na, K, Cl, CO2)
☑ Creatinine
☑ Glucose Random
☑ Calcium (Ca)
☑ Magnesium (Mg)
☑ Phosphate
☑ Albumin
☑ ALP
☑ ALT
☑ Bilirubin Total
☑ Bilirubin Direct
☑ GGT
☐ LD
☑ Protein Total
☑ Urea
☑ Urate (uric acid)

Other Labs

Order for ALL women of childbearing age

☐ HCG Beta - serum

Urine Tests

☐ Urinalysis

~*End*~

~*Start of Order Panel~ BMT Laboratory Investigation – REPEATING - Inpatient*

**BMT Laboratory Investigation – REPEATING - Inpatient

Keywords: labs, repeat, Day 2

REPEATING - Starting on second day of protocol

☐ Unit to Collect ☐ Lab to Collect

Draw the following labs daily for 35 occurrences:

☑ Complete Blood Count (CBC) with Differential
☑ Electrolytes (Na, K, Cl, CO2)
☑ Creatinine
☑ Magnesium (Mg)

Draw the following labs every Mon/Thurs for 5 weeks:

Hematology

☑ PTT
☑ PT (INR)
☑ Retic Count

Chemistry

☑ Glucose Random
☑ Calcium (Ca)
☑ Phosphate
☑ Albumin
☑ ALP
☑ ALT
☑ Bilirubin Total
☑ Bilirubin Direct
☐ GGT
☐ LD
☐ Protein Total
☑ Urea
☐ Urate (uric acid)

~End~

Day -6

~Start of Therapy Plan~ Rituximab IV/SUBCUT One-Time Dose – Inpatient

****Rituximab IV/SUBCUT One-Time Dose - Inpatient**

Keywords: ritux, intravenous, subcutaneous

Order Set Requirements:

Most recent:

- Height ______ cm
- Weight
  - actual ______ kg
- BSA ______ m^2
- Estimated Creatinine Clearance (CrCl) ______

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Rituximab Pre-Medications

Consider ordering Tumor Lysis Management prior to starting induction therapy

Required

☐ acetaminophen 650 mg PO once; Give 60 minutes pre-riTUXimab infusion
☐ cetirizine 10 mg PO daily starting 1 day prior to riTUXimab for a total of 2 doses; On day of riTUXimab infusion, give dose 60 minutes pre-riTUXimab

Alternative/Additional

Order the following medications alternatively or in addition to the required pre-medications as per clinician preference

☐ diphenhydrAMINE 50 mg PO/IV once; Give 45 minutes pre-riTUXimab infusion

☐ hydrocortisone sodium succinate 100 mg IV once; Give dose 30 minutes pre-riTUXimab infusion
☐ montelukast 10 mg PO daily starting 1 day prior to riTUXimab for a total of 2 doses; Take dose 60 minutes pre-riTUXimab infusion

☐ ranitidine 150 mg PO once; Give 30 to 60 minutes pre-riTUXimab infusion
☐ ranitidine 50 mg IV once; Give 30 minutes pre-riTUXimab infusion
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Emergency Medications

~Start of Order Panel~ Anaphylactic and Hypersensitivity Reaction Management Order Panel

****Anaphylactic and Hypersensitivity Reaction Management**

Keywords: emergency medications, infusion reaction, anaphylaxis, epinephrine, sympathomimetic agent, antihistamine, steroid, bronchodilator-Beta2-Adrenergic Agonist, nebulizer, opiate agonist, Adrenalin, Epi, Benadryl, Solu-cortef, Ventolin, Demerol

Anaphylactic Reaction

☐ epiNEPHrine 0.3 mg IM once for anaphylaxis with riTUXimab infusion; If signs and symptoms of anaphylaxis continue, may repeat dose every 5 minutes for a maximum of 3 doses; Use as first line of treatment for suspected anaphylaxis and refer to AHS *Anaphylaxis Management: Administration of Intramuscular Epinephrine* (Policy HCS-223) for further instructions on anaphylaxis management

Infusion-Related or Hypersensitivity Reaction

☐ diphenhydrAMINE 50 mg IV once PRN for infusion-related or hypersensitivity reaction with riTUXimab infusion
☐ hydrocortisone sodium succinate 100 mg IV once PRN for infusion related or hypersensitivity reaction with riTUXimab infusion
☐ salbutamol inhaler 100 mcg/dose 1-2 puffs every 4 to 6 hours PRN for dyspnea with riTUXimab infusion

☐ meperidine 25 mg IV every 4 hours PRN for rigors with riTUXimab infusion
☐ meperidine 50 mg IV every 4 hours PRN for rigors with riTUXimab infusion

☐ 0.9% NaCl _____ mL IV bolus at _____ mL/hour

~End~

Choose orders from either the *1. Rituximab - Intravenous* or *2. Rituximab – Subcutaneous* order groups:
Patients who have received a full dose of riTUXimab IV may receive subsequent doses as subcutaneous injections regardless of whether the patient had an infusion reaction or the grade of the reaction

1. Rituximab – Intravenous (Default)

Patient Care

☐ Vital Signs: For riTUXimab infusion
- Pre-riTUXimab infusion initiation
- Then with every rate change
- Then 15 minutes after infusion completed

Nurse Communication

☐ Nurse Communication: Anaphylaxis kit must be available during riTUXimab infusion as it may cause anaphylaxis reactions; Refer to *AHS Anaphylaxis Management: Administration of Intramuscular Epinephrine* (Policy HCS-223) for epiNEPHrine administration and further anaphylaxis management

☐ Nurse Communication: If patient experiences a hypersensitivity reaction associated with riTUXimab, nurse may initiate the use of emergency medications immediately upon presentation of symptoms, however, most responsible practitioner must also immediately be notified

☐ Nurse Communication: Refer to Alberta Health Services (AHS) provincial parenteral monograph for INITIAL, SUBSEQUENT and ACCELERATED infusion instructions, or infuse as per site practice

Recommend holding antihypertensives with initial riTUXimab infusion, however, consider patient status with subsequent doses
*Choose **BOTH**:*

☐ Nurse Communication: Hold anti-hypertensive medications 12 hours prior to riTUXimab infusion as transient hypotension may occur

AND

☐ Nurse Communication: Restart anti-hypertensive medications one hour post riTUXimab infusion if systolic blood pressure is GREATER than 120

OR

☐ Nurse Communication: Do not hold anti-hypertensive medications

Rituximab - IV

If patient has never received riTUXimab, first dose shall be given by intravenous route

☐ riTUXimab (375 mg/m^2) _____ mg IV once; Refer to provincial parenteral monograph for INITIAL, SUBSEQUENT and ACCELERATED infusion instructions, or infuse as per site practice; Recommend administration of antihistamine (cetirizine is preferred medication) and acetaminophen before riTUXimab infusion

2. Rituximab – Subcutaneous (Advanced Order Group - All)

Patient Care

☐ Vital Signs: once pre-riTUXimab administration

☐ Monitoring: observe patient for at least 15 minutes post riTUXimab administration; A longer period may be appropriate for patients with an increased risk of hypersensitivity reactions

Nurse Communication

☐ Nurse Communication: Refer to Alberta Health Services (AHS) provincial parenteral monograph for subcutaneous administration instructions

Recommend holding antihypertensive with initial riTUXimab administration, however, consider patient status with subsequent infusions
*Choose **BOTH**:*

☐ Nurse Communication: Hold anti-hypertensive medications 12 hours prior to riTUXimab infusion as transient hypotension may occur

AND

☐ Nurse Communication: Restart anti-hypertensive medications one hour post riTUXimab infusion if systolic blood pressure is GREATER than 120

OR

☐ Clinical Communication: Do not hold anti-hypertensive medications

Rituximab – Subcutaneous

Patients who have never received rituximab must receive their first full dose by IV infusion

☐ riTUXimab 1400 mg SUBCUT once; Administer over 5 minutes to abdomen as per provincial parenteral monograph **SUBCUTANEOUS administration** instructions; Observe for 15 minutes or longer if patient is high risk for hypersensitivity reaction; Recommend administration of antihistamine (cetirizine is preferred medication) and acetaminophen before riTUXimab administration

~End~

Day -6

Nurse Communication

☐ Nurse Communication: Initiate mouth care protocol
☐ Nurse Communication: Irradiated Blood Products only
☐ Nurse Communication: Ensure central venous access device is insitu and patent prior to initiating treatment protocol

Pre-Medication

☐ ondansetron 8 mg PO/IV once on Day -6 for a total of 1 dose **AND THEN** ondansetron 8 mg PO/IV TID on Day -5 to Day 1 for a total of 21 doses; Give morning doses pre-chemotherapy
☐ aprepitant 125 mg PO once on Day -6 for a total of 1 dose **AND THEN** aprepitant 80 mg PO daily on Day -5 and -4 for a total of 2 doses; Give dose pre-chemotherapy
☐ dexamethasone 12 mg IV/PO once on Day -6 for a total of 1 dose **AND THEN** dexamethasone 8 mg IV/PO daily on Day -5 to Day -1 for a total of 5 doses; Give dose 30 minutes pre-chemotherapy; Dose has been reduced by 50% due to interaction with aprepitant; Ensure patient is not already on scheduled dexamethasone or other corticosteroid

Systemic Therapy

Use ideal body weight if less than actual body weight for dosing calculations

☐ carmustine (300 mg/m^2) _____ mg IV once on Day -6 for a total of 1 dose; Infuse over 3 hours; Use non-DEHP tubing for administration; If giving rituximab, must be completed prior to administering carmustine
  ❖ *Dosing adjustments: Dosage reduction may be required for renal impairment*

Day -5, -4, -3, -2

Systemic Therapy

☐ etoposide (100 mg/m^2/dose) _____mg IV every 12 hours starting 0800 hours and 2000 hours on Day -5, -4, -3, -2 for a total of 8 doses; Infuse over 1-2 hours depending on dose, see provincial parenteral monograph; Use non-DEHP tubing for administration; At concentrations greater than 0.4mg/mL to less than 20mg/mL, filter through a 0.2 to 0.22 micron inline filter. No filter is required for other concentrations
- ❖ *Dosing adjustments: Dosage reduction may be required for renal and hepatic impairment*

☐ cytarabine (200 mg/m^2) _____ mg IV every 12 hours starting 0900 hours and 2100 hours on Day -5, -4, -3, -2 for a total of 8 doses; Infuse over 1 hour
- ❖ *Dosing adjustments: Dosage reduction may be required for hepatic impairment*

Day -1

Cryotherapy

☐ Cryotherapy Treatment – Start 30 minutes pre-melphalan; Instructions: Patient to hold ice chips in mouth until melted and repeat, continue until 6 hours post-melphalan administration; Eating hot foods and fluids is NOT recommended during cryotherapy

Systemic Therapy

☐ melphalan (140 mg/m^2-adjusted) _____ mg IV once starting 1000 hours on Day -1 for a total of 1 dose; Infuse IV over 1 hour; Drug has 120 minute stability once mixed
- ❖ *Dosing adjustments: Dosage reduction may be required for renal impairment*

Day 0

Required order set *(Currently under development; to be referenced in upon completion)*

- ➢ **Stem Cell Infusion – Autologous**

~Start of Smart Group~ Filgrastim

*BMT Filgrastim

For patient weighing less than 60 kg

☐ filgrastim 300 mcg SUBCUTANEOUS daily starting on Day 7; Discontinue when absolute neutrophil count (ANC) greater or equal to 1x10^9/L for 24 hours; May be given intravenously

OR

For patient weighing 60 to 90 kg

☐ filgrastim 480 mcg SUBCUTANEOUS daily starting on Day 7; Discontinue when absolute neutrophil count (ANC) greater or equal to 1x10^9/L for 24 hours; May be given intravenously

OR

For patient weighing greater than 90 kg

☐ filgrastim 600 mcg SUBCUTANEOUS daily starting on Day 7; Discontinue when absolute neutrophil count (ANC) greater or equal to $1x10^9$/L for 24 hours; May be given intravenously

~End~

~Start of Order Panel~ BMT Electrolyte Imbalance - Inpatient

** BMT Electrolyte Imbalance - Inpatient

Order Set Keywords: potassium, K, KCl, magnesium, Mg

Nurse Communication:

☐ Nurse Communication: Ensure patient has no other IV potassium infusing while receiving PRN IV potassium doses

Potassium:

*Choose **ONE** option based on site availability of product*

☐ KCl 20 mmol in 100 mL sterile water IV bolus daily PRN if potassium level 3.0 to 3.3 mmol/L; infuse as per provincial parenteral monograph

OR

☐ KCl 10 mmol in 100 mL sterile water IV bolus daily PRN; Give 2 boluses for a total of 20 mmol if potassium level 3.0 to 3.3 mmol/L; Infuse as per provincial parenteral monograph

Magnesium:

☐ magnesium sulfate 4 grams IV daily PRN if magnesium level is LESS than 0.55 mmol/L; Infuse as per provincial parenteral monograph

~End~

~Start of Smart Group~ Autologous Prophylactic/Supportive Medication - Inpatient

*Autologous Prophylactic/Supportive Medication – Inpatient

Prophylactic Medications

☐ valACYclovir 500 mg PO daily starting on day of admission

Start Protocol Day 14 if neutrophils are greater than $1x10E^9$/L

☐ sulfamethoxazole - trimethoprim 400 mg - 80 mg 1 tab PO daily starting on Day 14

OR

If patient has allergy to sulfa or sulfamethoxazole/trimethoprim order one or both:

Start Protocol Day 14 if neutrophils are greater than $1x10E^9$/L

☐ dapsone 50 mg PO daily starting on Day 14

☐ penicillin V potassium 300 mg PO BID starting on Day 14

Supportive Medications

Only order for menstruating women

☐ norethindrone - ethinyl estradiol (Ortho 1/35®) 1 tab PO daily starting on day of admission

~End~

Transition Planning

Patient and Family Education

MyHealth.Alberta.ca

- Cancer Resources
- Autologous Stem Cell Transplant

YouTube: AHS Channel

- CancerControl Alberta Playlist

Transitions to Primary Care

Alberta Health Services Website (External)

- Provider and Patient Resources

Patient Medication Teaching Sheets

MyHealth.Alberta.ca

- Carmustine
- Etoposide
- Cytarabine (low dose)
- Rituximab
- Aprepitant
- Ondansetron
- Dexamethasone
- Filgrastim
- Dapsone
- Sulfamethoxazole/Trimethoprim
- Penicillin V Potassium
- Fluconazole
- Valacyclovir
- Norethindrone/ethinyl estradiol

Alberta Health Services Website (Internal)

- Melphalan - Please see *Patient Medication Teaching Sheets* on the CancerControl Alberta AHS Internal website

References

1. Cancer Control Alberta: Guideline Resource Unit: Alberta Blood and Marrow Transplant Program (ABMTP) Standard Practice Manual. Alberta, Canada. https://www.albertahealthservices.ca/assets/info/hp/cancer/if-hp-cancer-guide-bmt-manual.pdf. Updated January 16, 2017. Accessed January 5, 2018.

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