Multiple myeloma consolidation RVd (lenalidomide bortezomib dexamethasone) GRIFFIN

ID: 3918 v.2 **Endorsed** Essential Medicine List

⚠ RVd protocols on eviQ:
There are several RVd protocols on eviQ. This reflects current Australian clinical practice with variations in dosing schedules, indications and treatment intent. Please ensure you are viewing the correct protocol.

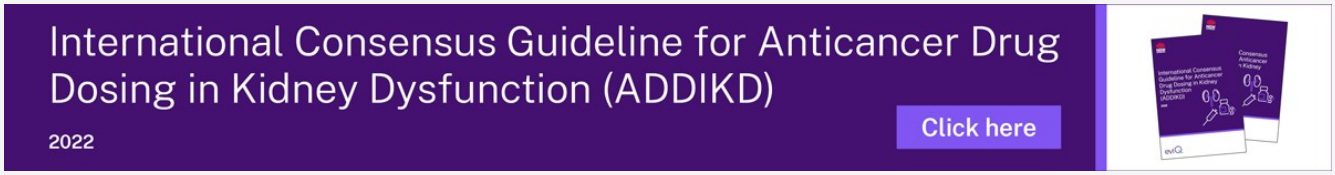
eviQ will closely review the clinical need for multiple versions of the RVd protocol to rationalise and consolidate in the future.

Patients with myeloma should be considered for inclusion into clinical trials. Link to ALLG website and ANZCTR website.

This protocol is based on limited evidence; refer to the evidence section of this protocol for more information.

Link to Medical Scientific Advisory Group (MSAG) Clinical Practice Guideline Multiple Myeloma
Link to MSAG update - bortezomib, lenalidomide and dexamethasone for initial treatment of multiple myeloma

The anticancer drug(s) in this protocol may have been included in the ADDIKD guideline. Dose recommendations in kidney dysfunction have yet to be updated to align with the ADDIKD guideline. Recommendations will be updated once the individual protocol has been evaluated by the reference committee. For further information refer to the ADDIKD guideline. To assist with calculations, use the eviQ Estimated Glomerular Filtration Rate (eGFR) calculator.



Related pages:

- Multiple myeloma RVd (lenalidomide bortezomib dexamethasone) GRIFFIN overview
- Multiple myeloma induction RVd (lenalidomide bortezomib dexamethasone) GRIFFIN
- Multiple myeloma maintenance lenalidomide GRIFFIN

Treatment schedule - Overview

Cycle 1 and 2

Drug	Dose	Route	Day
Dexamethasone	20 mg ONCE a day	PO	1 and 2, 8 and 9, 15 and 16
Lenalidomide	25 mg ONCE a day	PO	1 to 14
Bortezomib	1.3 mg/m^2	Subcut	1, 4, 8, 11

This protocol is not designed as stand alone therapy but is administered following induction RVd GRIFFIN (ID 3897) and 60-100 days after autologous stem cell transplant.

Frequency: 21 days

Cycles: 2 (commence first consolidation cycle 60-100 days after ASCT)

Notes:

- The eviQ reference committee considers that the use of weekly bortezomib is acceptable to minimise the risk of peripheral neuropathy. A weekly schedule of bortezomib 1.3 mg/m^2 (together with subcutaneous administration) appears to significantly reduce neurotoxicity compared to the twice weekly bortezomib schedule.[1]
- The eviQ reference committee considers that once-weekly dexamethasone dosing may be appropriate in suitable patients including transplant eligible patients.[2]

Drug status: **Lenalidomide**: (PBS authority)

NB: patient registration into a pregnancy prevention risk management program is required.

Full prescribing information and Authority Application forms available from the Department of Human Services website

Bortezomib: PBS restricted benefit

Dexamethasone: PBS general schedule

Combination bortezomib and lenalidomide cannot be administered under the PBS past cycle eight utilising the RVd 21-day (three weekly) protocol.

Lenalidomide is available as **5 mg**, **10 mg, 15 mg** and **25 mg** capsules

Dexamethasone is available as **0.5 mg** and **4 mg** tablets

Cost: ~ $3,100 per cycle

Treatment schedule - Detail

The supportive therapies (e.g. antiemetics, premedications, etc.), infusion times, diluents, volumes and routes of administration, if included, are listed as defaults. They may vary between institutions and can be substituted to reflect individual institutional policy.

*Antiemetics if included in the treatment schedule are based upon recommendations from national and international guidelines. These are **defaults only** and may be substituted to reflect individual institutional policy. Select here for **recommended doses of alternative antiemetics**.*

Cycle 1 and 2

Day 1		
Dexamethasone	20 mg (PO)	ONCE a day. Take in the morning with food.
Lenalidomide	25 mg (PO)	ONCE a day on days 1 to 14. Take at same time each day, either with or without food.
Bortezomib	1.3 mg/m^2 (Subcut)	via subcutaneous injection
Day 2		
Dexamethasone	20 mg (PO)	ONCE a day. Take in the morning with food.
Lenalidomide	25 mg (PO)	ONCE a day on days 1 to 14. Take at same time each day, either with or without food.
Day 3		
Lenalidomide	25 mg (PO)	ONCE a day on days 1 to 14. Take at same time each day, either with or without food.
Day 4		
Lenalidomide	25 mg (PO)	ONCE a day on days 1 to 14. Take at same time each day, either with or without food.
Bortezomib	1.3 mg/m^2 (Subcut)	via subcutaneous injection
Day 5 to 7		
Lenalidomide	25 mg (PO)	ONCE a day on days 1 to 14. Take at same time each

Day 5 to 7		
		day, either with or without food.
Day 8		
Dexamethasone	20 mg (PO)	ONCE a day. Take in the morning with food.
Lenalidomide	25 mg (PO)	ONCE a day on days 1 to 14. Take at same time each day, either with or without food.
Bortezomib	1.3 mg/m^2 (Subcut)	via subcutaneous injection
Day 9		
Dexamethasone	20 mg (PO)	ONCE a day. Take in the morning with food.
Lenalidomide	25 mg (PO)	ONCE a day on days 1 to 14. Take at same time each day, either with or without food.
Day 10		
Lenalidomide	25 mg (PO)	ONCE a day on days 1 to 14. Take at same time each day, either with or without food.
Day 11		
Lenalidomide	25 mg (PO)	ONCE a day on days 1 to 14. Take at same time each day, either with or without food.
Bortezomib	1.3 mg/m^2 (Subcut)	via subcutaneous injection
Day 12 to 14		
Lenalidomide	25 mg (PO)	ONCE a day on days 1 to 14. Take at same time each day, either with or without food.
Day 15 and 16		
Dexamethasone	20 mg (PO)	ONCE a day. Take in the morning with food.

This protocol is not designed as stand alone therapy but is administered following induction RVd GRIFFIN (ID 3897) and autologous stem cell transplant.

Frequency: 21 days

Cycles: 2 (commence first consolidation cycle 60-100 days after ASCT)

Indications and patient population

- Newly diagnosed multiple myeloma patients post autologous stem cell transplantation

Clinical information

Caution with oral anti-cancer drugs	Select links for information on the safe prescribing, dispensing and administration of orally administered anti-cancer drugs. Read more about the COSA guidelines and oral anti-cancer therapy
Emetogenicity minimal or low	No routine prophylaxis required. If patients experience nausea and/or vomiting, consider using the low emetogenic risk regimen. Read more about preventing anti-cancer therapy induced nausea and vomiting

Teratogenic effects	Immunomodulatory drugs (IMiDs) include thalidomide, lenalidomide and pomalidomide. They can cause severe congenital disabilities or death to an unborn baby when taken during pregnancy. All patients and partners of patients that can conceive a child must use at least one reliable contraceptive method for at least 4 weeks before starting treatment, during treatment (including dose interruptions), and for 4 weeks after stopping treatment. Male patients should also use a condom when having sexual intercourse with a woman of childbearing potential during treatment (including dose interruptions), and for 4 weeks after stopping treatment. In female patients and female partners of male patients, a pregnancy test should be carried out prior to initiating treatment (after 4 weeks of contraception use), weekly during the first month of treatment and monthly thereafter. Effective contraception methods and adequate contraception timeframes should be discussed with all patients of reproductive potential. Prescription of an IMiD requires patient registration with a pregnancy prevention program. Full prescribing information and Authority Application forms available from the Department of Human Services website
Thromboembolism	Patients are at an increased risk of venous thrombosis with this treatment. Risk assessment for VTE should be performed prior to and during treatment. It is the consensus opinion of the Haematology Reference Committee that concomitant thromboprophylaxis is recommended: consider using low dose aspirin for patients without pre-existing risk factors, while patients with pre-existing risk factors should receive enoxaparin 40 mg subcut daily for the duration of treatment (unless contraindicated; reduce dose in kidney dysfunction). Read more about the prophylaxis of venous thromboembolism (VTE) in multiple myeloma
Peripheral neuropathy	Peripheral neuropathy (PN), including grade 2 and 3 events are reported less frequently with subcutaneous (SC) dosing of bortezomib than with intravenous (IV) administration. All patients should be assessed regularly for symptoms of peripheral neuropathy. Most cases are reversible with dose modifications. Read more about peripheral neuropathy Link to chemotherapy-induced peripheral neuropathy screening tool
Orthostatic hypotension	Caution in patients with history of syncope or postural hypotension and those taking antihypertensive medications. Ensure patient is well hydrated prior to therapy.
Bone modifying agents	Use of a bone modifying agent (BMA) should be considered in all patients with symptomatic myeloma requiring treatment. For patients with newly diagnosed symptomatic myeloma, zoledronic acid, pamidronate or denosumab should be considered for monthly administration (adjust for kidney dysfunction where appropriate) for up to 2 years. A longer duration of therapy may be appropriate (MRC M IX trial).[3] For more information, please see the following protocols: ID 137 Multiple myeloma zoledronic acid ID 147 Multiple myeloma pamidronate ID 3964 Multiple myeloma denosumab - note denosumab is TGA approved but not PBS reimbursed for this indication.
Bisphosphonates and dental review	Caution should be taken with prolonged use of bisphosphonates due to the risk of osteonecrosis of the jaw (ONJ). A dental review prior to treatment is recommended, and all dental issues treated before the initiation of bisphosphonates. Dental review 6 to 12 monthly during treatment is advisable to minimise risk of ONJ. Concurrent daily oral supplements of calcium 500 mg and vitamin D 400 International Units are recommended. Read more about medication-related osteonecrosis of the jaw (MRONJ)
Corticosteroids	Diabetic patients should monitor their blood glucose levels closely. To minimise gastric irritation, advise patient to take immediately after food. Consider the use of a H2 antagonist or proton pump inhibitor if appropriate. Read more about acute short term effects from corticosteroids

Tumour lysis risk	Assess patient for risk of developing tumour lysis syndrome. Read more about prevention and management of tumour lysis syndrome.
Pneumocystis jirovecii pneumonia (PJP) prophylaxis	PJP prophylaxis is recommended e.g. trimethoprim/sulfamethoxazole 160/800 mg PO one tablet twice daily, twice weekly (e.g. on Mondays and Thursdays) OR one tablet three times weekly (e.g. on Mondays, Wednesdays and Fridays). Read more about prophylaxis of pneumocystis jiroveci (carinii) in cancer patients
Antiviral prophylaxis	Bortezomib is associated with a risk of Herpes Zoster infection (shingles). Antiviral prophylaxis is recommended to protect from HSV and VZV reactivation during active therapy including periods of neutropenia. Read about antiviral prophylaxis drugs and doses
Growth factor support	G-CSF (short or long-acting) is available on the PBS for chemotherapy induced neutropenia depending on clinical indication and/or febrile neutropenia risk. Access the PBS website
Blood tests	FBC, EUC, LFTs, calcium, magnesium, phosphate and BSL at baseline and regularly throughout treatment. Weekly FBC is recommended for the first cycle, then prior to the start of each subsequent cycle or as clinically indicated.
Hepatitis B screening and prophylaxis	Routine screening for HBsAg and anti-HBc is recommended prior to initiation of treatment. Prophylaxis should be determined according to individual institutional policy. Read more about hepatitis B screening and prophylaxis in cancer patients requiring cytotoxic and/or immunosuppressive therapy
Vaccinations	Live vaccines are contraindicated in cancer patients receiving immunosuppressive therapy and/or who have poorly controlled malignant disease. Refer to the recommended schedule of vaccination for immunocompromised patients, as outlined in the Australian Immunisation Handbook. Read more about COVID-19 vaccines and cancer.
Fertility and lactation	Cancer treatment can have harmful effects on fertility and this should be discussed with all patients of reproductive potential prior to commencing treatment. Possibility of infant risk should be discussed with breastfeeding patients. Read more about the effect of cancer treatment on fertility

Dose modifications

Evidence for dose modifications is limited, and the recommendations made on eviQ are intended as a guide only. They are generally conservative with an emphasis on safety. Any dose modification should be based on clinical judgement, and the individual patient's situation including but not limited to treatment intent (curative vs palliative), the anti-cancer regimen (single versus combination therapy versus chemotherapy versus immunotherapy), biology of the cancer (site, size, mutations, metastases), other treatment related side effects, additional co-morbidities, performance status and patient preferences.Suggested dose modifications are based on clinical trial findings, product information, published guidelines and reference committee consensus . The dose reduction applies to each individual dose and not to the total number of days or duration of treatment cycle unless stated otherwise. Non-haematological gradings are based on Common Terminology Criteria for Adverse Events (CTCAE) unless otherwise specified. Renal and hepatic dose modifications have been standardised where possible. For more information see dosing considerations & disclaimer .

The dose recommendations in kidney dysfunction (i.e.renal impairment) displayed may not reflect those in the ADDIKD guideline and have been included for historical reference only. Recommendations will be updated once the individual protocol has been evaluated by the reference committee, with this version of the protocol then being archived. Clinicians are expected to refer to the ADDIKD guideline prior to prescribing in kidney dysfunction.
International Consensus Guideline for Anticancer Drug Dosing in Kidney Dysfunction (ADDIKD).

The dose modifications in this section may differ from the trial protocol and product information and are considered by the reference committee to be reflective of clinical practice.

Initial treatment with lenalidomide should not be started if ANC less than 1.0 x 10^9/L and/or platelets less than 75 x 10^9/L (or platelets less than 30 x 10^9/L if heavy bone marrow involvement), however, may be commenced at the discretion of the treating haematologist.

Dose reduction steps for lenalidomide	
Starting dose	25 mg
Dose level 1	15 mg
Dose level 2	10 mg
Dose level 3	5 mg

Note: the dose reduction steps for lenalidomide differ from the product information due to 20 mg strength capsules being unavailable on the PBS.

Dose reduction steps for bortezomib	
Bortezomib should be withheld at the onset of any Grade 4 haematological toxicity or any Grade 3 non-haematological toxicity, with the exception of neuropathy. Upon resolution of the toxicity, bortezomib should be reinitiated at a 25% reduction of the previous dose as follows:	
Starting dose	1.3 mg/m^2
Dose level 1	1 mg/m^2
Dose level 2	0.7 mg/m^2
If the toxicity is not resolved or if it recurs at the lowest dose, discontinuation of bortezomib must be considered unless the benefit of treatment clearly outweighs the risk.	

Haematological toxicity	
ANC x 10^9/L (pre-treatment blood test)	
First fall to less than 0.5	Interrupt lenalidomide and bortezomib treatment. Consider using G-CSF.
Return to greater than or equal to 0.5 when neutropenia is the only observed toxicity	Resume lenalidomide and bortezomib at starting dose
Return to greater than or equal to 0.5 when dose-dependent haematological toxicities other than neutropenia are observed	Resume lenalidomide at next lower dose level and consider reducing bortezomib by one dose level.
For each subsequent drop to less than 0.5	Interrupt lenalidomide and bortezomib treatment
Return to greater than or equal to 0.5	Resume lenalidomide and bortezomib at next lower dose level
Consider using G-CSF for neutropenia	
Platelets x 10^9/L (pre-treatment blood test)	
30 to 50 (without complications)	Reduce lenalidomide by one dose level for the remainder of the cycle.
Less than 30	Withhold lenalidomide and botezomib until recovery. Upon recovery of platelet count to greater than or equal to 50, resume lenalidomide and bortezomib at next lower dose level.

Renal impairment	
Lenalidomide is substantially excreted by the kidneys. Monitoring of renal function is advised in all patients with renal impairment. The following dose adjustments are recommended at the **start of therapy** for patients with moderate or severe impaired renal function or endstage renal disease.	
Creatinine clearance (mL/min)	
30 to 50	Reduce lenalidomide dose to 10 mg once daily*

<30 (not requiring dialysis)	Reduce lenalidomide dose to 15 mg on alternate days (every 48 hours)
<30 (requiring dialysis)	Reduce lenalidomide dose to 5 mg once daily. On dialysis, the dose should be administered following dialysis.

**The dose may be escalated to 15 mg once daily after 2 cycles if the patient is not responding to treatment and is tolerating the treatment.*

Hepatic impairment	
Hepatic dysfunction	
Moderate or severe	Reduce bortezomib to 0.7 mg/m^2 per dose for the first cycle. Consider dose escalation to 1 mg/m^2 or further dose reduction to 0.5 mg/m^2 for subsequent cycles depending on patient tolerability. No formal studies of lenalidomide in patients with hepatic impairment, therefore no specific dose recommendations.

Peripheral neuropathy	
Grade 1	No action required
Grade 1 with pain or Grade 2	Reduce bortezomib to 1 mg/m^2 OR Change bortezomib treatment schedule to 1.3 mg/m^2 once per week
Grade 2 with pain or Grade 3	Withhold bortezomib until toxicity resolves. Reinitiate with a reduced dose of bortezomib at 0.7 mg/m^2 and change treatment schedule to once per week.
Grade 4	Discontinue bortezomib

Dermatological reactions	
Rare cases of Stevens-Johnson syndrome and toxic epidermal necrolysis have been reported. These may be potentially fatal.	
Rash [4]	
Grade 1	Continue lenalidomide. Treat with topical corticosteroids and oral antihistamines.
Grade 2	Consider interruption of lenalidomide. Treat with topical corticosteroids and oral antihistamines until toxicity resolves.
Grade 3	Consider interruption of lenalidomide. Treat with oral antihistamines or oral corticosteroids until toxicity resolves.
Stevens-Johnson syndrome or toxic epidermal necrolysis	Permanent discontinuation of lenalidomide treatment.

Interactions

Drug interactions in eviQ protocols are under review and being updated to align with current literature. Further site-wide updates and changes will occur in due course. ***References & Disclaimer***

The drug interactions shown below are not an exhaustive list. For a more comprehensive list and for detailed information on specific drug interactions and clinical management, please refer to the specific drug product information and the following key resources:

- *MIMS - interactions tab (includes link to a CYP-450 table) (login required)*
- *Australian Medicines Handbook (AMH) – interactions tab (login required)*
- *Micromedex Drug Interactions (login required)*
- *Cancer Drug Interactions*
- *Cytochrome P450 Drug Interactions*

Bortezomib		
	Interaction	**Clinical management**
Antihypertensives	Additive hypotensive effect	Monitor blood pressure. Ensure patient is well hydrated prior to bortezomib dose. Adjust antihypertensive dose as required
Strong CYP3A4 inhibitors (e.g. ketoconazole, ritonavir)	Potentially increased bortezomib toxicity due to reduced clearance	Monitor patients closely for bortezomib toxicity (thrombocytopenia, neutropenia, peripheral neuropathy)
Strong CYP3A4 and P-gp inducers (e.g. rifampin, St John's Wort)	Potentially reduced efficacy of bortezomib due to increased clearance	Monitor patients closely for decreased bortezomib efficacy
Other CYP3A4 inhibitors or inducers (e.g. azoles, grapefruit juice, macrolides, carbamazepine, phenytoin)	Low levels of evidence for interactions, coadministration has not been studied	Monitor patients closely for either toxicities or reduced efficacy
Oral hypoglycaemics	Hypoglycaemia or hyperglycaemia	Monitor blood glucose levels and adjust oral hypoglycaemic dose as required
Green tea	May diminish the anti-cancer effect of bortezomib	Avoid combination

Dexamethasone		
	Interaction	**Clinical management**
CYP3A4 interactions	Dexamethasone is a substrate of CYP3A4 and a weak to moderate inducer of CYP3A4. The clinical relevance of CYP3A4 induction by dexamethasone is unknown as the mechanism has yet to be established	The effects of the concomitant use of dexamethasone with other CYP3A4 inducers, inhibitors or substrates is variable. If used concomitantly, monitor patients closely for adverse drug reactions
Warfarin	Concurrent use may result in increased risk of bleeding or diminished effects of warfarin	Monitor prothrombin time / INR (especially during initiation or discontinuation) and for signs of drug toxicity during concomitant use; adjust warfarin dose as required
Oral hypoglycaemics	Corticosteroids may cause hyperglycaemia and worsen diabetes control	Monitor blood glucose levels and adjust oral hypoglycaemic dose as required

Lenalidomide		
	Interaction	**Clinical management**
Digoxin	Potentially increased digoxin plasma levels when combined with lenalidomide; mechanism unknown	Monitor digoxin levels and for signs of drug toxicity during treatment with lenalidomide
HMG-CoA reductase inhibitors (Statins)	Potentially additive toxicity	Monitor for signs and symptoms of myotoxicity and rhabdomyolysis (e.g.: unexplained muscle pain, muscle stiffness or tenderness, dark urine) during concomitant use
Erythropoietic agents, combined oral contraceptives or hormone replacement therapy	Additive risk of thromboembolic events due to an increased risk of VTE	Consider the benefit/risk of concomitant therapy

Vaccines		
Vaccines	Diminished response to vaccines and increased risk of infection with live vaccines.	Live vaccines (e.g. BCG, MMR, zoster and varicella) are contraindicated in patients on immunosuppressive therapy. Use with caution in patients on non-immunosuppressive therapy. For more information; refer to the recommended schedule of vaccination for cancer patients, as outlined in the Australian Immunisation Handbook

Administration

eviQ provides safe and effective instructions on how to administer cancer treatments. However, eviQ does not provide every treatment delivery option, and is unable to provide a comprehensive list of cancer treatment agents and their required IV line giving set/filter. There may be alternative methods of treatment administration, and alternative supportive treatments that are also appropriate. Please refer to the individual product information monographs via the TGA website for further information.

Day 1

Approximate treatment time: 30 to 60 minutes.

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Peripheral neuropathy assessment tool.

Any toxicity grade 1 or greater may require dose reduction or delay of treatment and review by medical officer before commencing treatment.

Note: Dialysis patients: administer bortezomib either after the patient has been dialysed or a minimum of 4 hours prior to dialysis.

- baseline weight

Pre treatment medication

Verify antiemetics taken or administer as prescribed.

Dexamethasone

- administer orally ONCE a day in the morning, with food on **days 1 and 2, 8 and 9 and 15 and 16**

Note: if a dose is forgotten or vomited, contact treating team.

Treatment - Time out

Lenalidomide

- administer orally ONCE a day, at the same time each day, on **days 1 to 14** every 21 days
- to be swallowed whole with a glass of water; do not break, crush or chew
- can be taken either with or without food

Note: missed doses should not be taken if it is less than 12 hours until the next dose.

Chemotherapy - Time out

Bortezomib

- administer by subcutaneous injection
- rotate the injection site for each injection

- pain, inflammation and thrombophlebitis may occur at injection site
- doses of bortezomib must be at least 72 hours apart.

Note: Bortezomib is given day 1, 4, 8 and 11 of each cycle.

Continue safe handling precautions until 7 days after completion of drug(s)

Day 2

This is an oral treatment

Safe handling and waste management (reproductive risk only)

Safe administration

General patient assessment prior to each day of treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before commencing treatment.

Pre treatment medication

Verify premedication taken or administer as prescribed.

Dexamethasone

- administer orally ONCE a day in the morning, with food on **days 1 and 2, 8 and 9 and 15 and 16**

Note: if a dose is forgotten or vomited, contact treating team.

Treatment - Time out

Lenalidomide

- administer orally ONCE a day, at the same time each day, on **days 1 to 14** every 21 days
- to be swallowed whole with a glass of water; do not break, crush or chew
- can be taken either with or without food

Note: missed doses should not be taken if it is less than 12 hours until the next dose.

Continue safe handling precautions (reproductive risk only) for 7 days after completion of drug(s).

Day 3

This is an oral treatment

Safe handling and waste management (reproductive risk only)

Safe administration

General patient assessment prior to each day of treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before commencing treatment.

Pre treatment medication

Verify premedication taken or administer as prescribed.

Treatment - Time out

Lenalidomide

- administer orally ONCE a day, at the same time each day, on **days 1 to 14** every 21 days
- to be swallowed whole with a glass of water; do not break, crush or chew
- can be taken either with or without food

Note: missed doses should not be taken if it is less than 12 hours until the next dose.

Continue safe handling precautions (reproductive risk only) for 7 days after completion of drug(s).

Day 4

Approximate treatment time: 30 to 60 minutes.

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Peripheral neuropathy assessment tool.

Any toxicity grade 1 or greater may require dose reduction or delay of treatment and review by medical officer before commencing treatment.

Note: Dialysis patients: administer bortezomib either after the patient has been dialysed or a minimum of 4 hours prior to dialysis.

Pre treatment medication

Verify premedication taken or administer as prescribed.

Treatment - Time out

Lenalidomide

- administer orally ONCE a day, at the same time each day, on **days 1 to 14** every 21 days
- to be swallowed whole with a glass of water; do not break, crush or chew
- can be taken either with or without food

Note: missed doses should not be taken if it is less than 12 hours until the next dose.

Chemotherapy - Time out

Bortezomib

- administer by subcutaneous injection
- rotate the injection site for each injection
- pain, inflammation and thrombophlebitis may occur at injection site
- doses of bortezomib must be at least 72 hours apart.

Note: Bortezomib is given day 1, 4, 8 and 11 of each cycle.

Continue safe handling precautions until 7 days after completion of drug(s)

Day 5 - 7

This is an oral treatment

Safe handling and waste management (reproductive risk only)

Safe administration

General patient assessment prior to each day of treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before commencing treatment.

Pre treatment medication

Verify premedication taken or administer as prescribed.

Treatment - Time out

Lenalidomide

- administer orally ONCE a day, at the same time each day, on **days 1 to 14** every 21 days
- to be swallowed whole with a glass of water; do not break, crush or chew
- can be taken either with or without food

Note: missed doses should not be taken if it is less than 12 hours until the next dose.

Continue safe handling precautions (reproductive risk only) for 7 days after completion of drug(s).

Day 8

Approximate treatment time: 30 to 60 minutes.

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Peripheral neuropathy assessment tool.

Any toxicity grade 1 or greater may require dose reduction or delay of treatment and review by medical officer before commencing treatment.

Note: Dialysis patients: administer bortezomib either after the patient has been dialysed or a minimum of 4 hours prior to dialysis.

Pre treatment medication

Verify antiemetics taken or administer as prescribed.

Dexamethasone

- administer orally ONCE a day in the morning, with food on **days 1 and 2, 8 and 9 and 15 and 16**

Note: if a dose is forgotten or vomited, contact treating team.

Treatment - Time out

Lenalidomide

- administer orally ONCE a day, at the same time each day, on **days 1 to 14** every 21 days
- to be swallowed whole with a glass of water; do not break, crush or chew
- can be taken either with or without food

Note: missed doses should not be taken if it is less than 12 hours until the next dose.

Chemotherapy - Time out

Bortezomib

- administer by subcutaneous injection
- rotate the injection site for each injection
- pain, inflammation and thrombophlebitis may occur at injection site
- doses of bortezomib must be at least 72 hours apart.

Note: Bortezomib is given day 1, 4, 8 and 11 of each cycle.

Continue safe handling precautions until 7 days after completion of drug(s)

Day 9

This is an oral treatment

Safe handling and waste management (reproductive risk only)

Safe administration

General patient assessment prior to each day of treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before commencing treatment.

Pre treatment medication

Verify premedication taken or administer as prescribed.

Dexamethasone

- administer orally ONCE a day in the morning, with food on **days 1 and 2, 8 and 9 and 15 and 16**

Note: if a dose is forgotten or vomited, contact treating team.

Treatment - Time out

Lenalidomide

- administer orally ONCE a day, at the same time each day, on **days 1 to 14** every 21 days
- to be swallowed whole with a glass of water; do not break, crush or chew
- can be taken either with or without food

Note: missed doses should not be taken if it is less than 12 hours until the next dose.

Continue safe handling precautions (reproductive risk only) for 7 days after completion of drug(s).

Day 10

This is an oral treatment

Safe handling and waste management (reproductive risk only)

Safe administration

General patient assessment prior to each day of treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before commencing treatment.

Pre treatment medication

Verify premedication taken or administer as prescribed.

Treatment - Time out

Lenalidomide

- administer orally ONCE a day, at the same time each day, on **days 1 to 14** every 21 days
- to be swallowed whole with a glass of water; do not break, crush or chew
- can be taken either with or without food

Note: missed doses should not be taken if it is less than 12 hours until the next dose.

Continue safe handling precautions (reproductive risk only) for 7 days after completion of drug(s).

Day 11

Approximate treatment time: 30 to 60 minutes.

Safe handling and waste management

Safe administration

General patient assessment prior to each day of treatment.

Peripheral neuropathy assessment tool.

Any toxicity grade 1 or greater may require dose reduction or delay of treatment and review by medical officer before commencing treatment.

Note: Dialysis patients: administer bortezomib either after the patient has been dialysed or a minimum of 4 hours prior to dialysis.

Pre treatment medication

Verify premedication taken or administer as prescribed.

Treatment - Time out

Lenalidomide

- administer orally ONCE a day, at the same time each day, on **days 1 to 14** every 21 days
- to be swallowed whole with a glass of water; do not break, crush or chew
- can be taken either with or without food

Note: missed doses should not be taken if it is less than 12 hours until the next dose.

Chemotherapy - Time out

Bortezomib

- administer by subcutaneous injection
- rotate the injection site for each injection
- pain, inflammation and thrombophlebitis may occur at injection site
- doses of bortezomib must be at least 72 hours apart.

Note: Bortezomib is given day 1, 4, 8 and 11 of each cycle.

Continue safe handling precautions until 7 days after completion of drug(s)

Day 12 - 14

This is an oral treatment

Safe handling and waste management (reproductive risk only)

Safe administration

General patient assessment prior to each day of treatment.

Any toxicity grade 2 or greater may require dose reduction, delay or omission of treatment and review by medical officer before commencing treatment.

Pre treatment medication

Verify premedication taken or administer as prescribed.

Treatment - Time out

Lenalidomide

- administer orally ONCE a day, at the same time each day, on **days 1 to 14** every 21 days
- to be swallowed whole with a glass of water; do not break, crush or chew
- can be taken either with or without food

Note: missed doses should not be taken if it is less than 12 hours until the next dose.

Continue safe handling precautions (reproductive risk only) for 7 days after completion of drug(s).

Day 15,16

This is an oral treatment

Dexamethasone

- administer orally ONCE a day in the morning, with food on **days 1 and 2, 8 and 9 and 15 and 16**

Note: if a dose is forgotten or vomited, contact treating team.

Discharge information

Dexamethasone tablets and lenalidomide capsules

- Dexamethasone tablets and lenalidomide capsules with written instructions on how to take them.

Antiemetics

- Antiemetics as prescribed.

Thromboprophylaxis

- Low dose aspirin OR enoxaparin 40 mg subcut daily for the duration of treatment if prescribed.

Growth factor support

- Arrangements for administration if prescribed.

Prophylaxis medications

- Prophylaxis medications (if prescribed) i.e. tumour lysis prophylaxis, PJP prophylaxis, antivirals.

Patient information

- Ensure patient receives patient information sheet.

Side effects

The side effects listed below are not a complete list of all possible side effects for this treatment. Side effects are categorised into the approximate onset of presentation and should only be used as a guide.

Immediate (onset hours to days)	
Hypotension	Low blood pressure is commonly associated with bortezomib treatment.
Nausea and vomiting	Read more about prevention of treatment induced nausea and vomiting
Taste and smell alteration	Read more about taste and smell changes

Early (onset days to weeks)	
Neutropenia	Abnormally low levels of neutrophils in the blood. This increases the risk of infection. Any fever or suspicion of infection should be investigated immediately and managed aggressively. Read more about immediate management of neutropenic fever
Thrombocytopenia	Thrombocytopenia is a reduction in the normal levels of functional platelets. It is associated with bortezomib treatment, particularly in patients who have had a number of prior therapies. However, it is rarely severe enough to postpone subsequent cycles. Read more about thrombocytopenia associated with bortezomib
Thromboembolism	Venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE) is significantly increased in multiple myeloma patients treated with thalidomide in combination with other therapies including doxorubicin, melphalan and prednisolone or dexamethasone; and lenalidomide and pomalidomide in combination with dexamethasone. Read more about management of thromboembolism (VTE) in multiple myeloma
Arthralgia and myalgia	Generalised joint pain or and/or stiffness and muscle aches, often worse upon waking or after long periods of inactivity. Can improve with movement. May be mild or severe, intermittent or constant and accompanied by inflammation. Read more about arthralgia and myalgia
Constipation	
Cough	
Diarrhoea	Read more about treatment induced diarrhoea
Fatigue	Read more about fatigue
Peripheral neuropathy	Typically symmetrical sensory neuropathy, affecting the fingers and toes, sometimes progressing to the hands and feet. It is associated with several classes of anti-cancer drugs. These include taxanes, platinum-based compounds, vinca alkaloids and some drugs used to treat multiple myeloma. Read more about peripheral neuropathy
Respiratory tract infection	
Side effects of corticosteroids	Insomnia, oedema, increased risk of infection e.g. oral thrush, gastric irritation, worsening of peptic ulcer disease, increased blood sugar levels, loss of diabetic control, mood and behavioural changes - including anxiety, euphoria, depression, mood swings, increased appetite and weight gain, osteoporosis and fractures (long term use), bruising and skin fragility are associated with corticosteroid use.
Skin rash	Anti-cancer drugs can cause a number of changes in the skin with maculo-papular rash the most common type of drug-induced skin reaction. Read more about skin rash

Late (onset weeks to months)	
Anaemia	Abnormally low levels of red blood cells (RBCs) or haemoglobin in the blood. Read more about anaemia
Diarrhoea (late onset)	Chronic loose stools due to bile acid malabsorption has been observed in patients receiving lenalidomide. Referral to Gastroenterology should be considered. An empiric trial of cholestyramine (a bile-acid binding resin) is reasonable for these patients. Read more about treatment induced diarrhoea
Hypothyroidism	
Muscle cramps	Cramping in the hands, calves and/or thighs associated with hypomagnesaemia (low magnesium) and/or hypocalcaemia (low calcium).
Stevens-Johnson syndrome (SJS)	Stevens-Johnson syndrome (SJS) or toxic epidermal necrolysis (TEN) is characterised by fever, malaise, a painful rash, erythematous macules, targetoid lesions, or diffuse erythema progressing to vesicles and bullae, and oral, ocular and/or genital mucositis with painful mucosal erosion. Patients who develop SJS/TEN should never be re-exposed to the causative agent.

Delayed (onset months to years)	
Cataract	A disorder characterised by partial or complete opacity of the crystalline lens of one or both eyes. This results in a decrease in visual acuity and eventual blindness if untreated.
Pulmonary toxicity	Pulmonary toxicity may include damage to the lungs, airways, pleura and pulmonary circulation. Read more about pulmonary toxicity associated with anti-cancer drugs

Evidence

Lenalidomide/bortezomib/dexamethasone (RVd) has not been compared to other triplet induction regimens (cyclophosphamide, bortezomib, dexamethasone [CyBorD or VCD] and bortezomib, thalidomide, dexamethasone [VTD]) in phase III randomised studies. However, on the basis of cross-trial comparisons of response rates and toxicity, the expert reference panel supports the use of RVd as induction treatment for transplant eligible patients with multiple myeloma (MM). The expert reference panel supported publication of the protocol on the basis of the information summarised below. The committee was most strongly influenced by the phase II GRIFFIN study.[5]

The dosing schedule in this eviQ protocol is based on the GRIFFIN study.[5] 207 newly diagnosed transplant eligible patients with MM were randomised to receive 4 cycles of RVd +/- daratumumab induction, autologous stem cell transplant (ASCT) and then 2 cycles of RVd +/- daratumumab consolidation (followed by lenalidomide maintenance). This schedule was preferred by the committee over other published regimens as it utilised subcutaneous bortezomib (which is associated with significantly lower peripheral neuropathy rates than intravenous administration) and could be administered within the PBS restrictions.

Source	Study & Year Published	Supports Use	Is the dose and regimen consistent with the protocol?	Comments
Phase III trials	Attal et al. 2017 (IFM-2009)[6]	**Yes**	No	3 induction, 2 consolidation cycles IV bortezomib 1.3 mg/m^2 Day 1,4,8,11 Lenalidomide 25 mg Day 1-14 Dexamethasone 20 mg Day 1,2,4,5,8,9,11,12
	Rosinol et al. 2019 (PETHEMA)[7]	**Yes**	No	28 day cycles. 6 induction, 2 consolidation cycles. SC bortezomib 1.3 mg/m^2 Day 1,4,8,11 Lenalidomide 25 mg Day 1-21 Dexamethasone 40 mg Day 1-4, 9-12

Phase II trials	Voorhees et al. 2020 (GRIFFIN)[5]	**Yes**	Yes	-
	Roussel et al. 2014[8]	**Yes**	No	3 induction, 2 consolidation cycles IV bortezomib 1.3 mg/m^2 Day 1,4,8,11 Lenalidomide 25 mg Day 1-14 Dexamethasone 40 mg Day 1,8,15
Retrospective studies	Okazuka et al. 2020[9]	**Yes**	No	28 day cycles. 4 induction cycles. SC bortezomib 1.3 mg/m^2 Day 1,8,15,22 Lenalidomide 15 mg Day 2-21 (not on Day 1,8,15) Dexamethasone 40 mg weekly

Guidelines	Date published/revised	Supports Use	Is the dose and regimen consistent with the protocol?	Comments
NCCN	V.3.2020 - 2021	**Yes**	No	IV/SC bortezomib 1.3 mg/m^2 Day 1,4,8,11 Lenalidomide 25 mg Day 1-14 Dexamethasone 20 mg Day 1,2,4,5,8,9,11,12 or Dexamethasone 40 mg Day 1,8,15
BCCA	01/02/2021 Revised: 01/06/2022	**N/A**	No	Published protocol for non-transplant candidates only.
CCO	2019	**N/A**	No	Published protocol for non-transplant candidates only.

Efficacy

Table 1 - GRIFFIN study[5]

Table 2. Primary analysis: summary of responses by the end of consolidation*

	D-RVd	RVd	Odds Ratio (95% CI)†	*P* value
Best response‡	(n = 99)	(n = 97)		
Overall response rate, n (%)	98 (99.0)	89 (91.8)	8.75 (1.08, 71.01)	0.0160§
Stringent complete response	42 (42.4)	31 (32.0)	1.57 (0.87, 2.82)	0.0680§,¶
Complete response or better	51 (51.5)	41 (42.3)		
Complete response	9 (9.1)	10 (10.3)		
Very good partial response or better	90 (90.9)	71 (73.2)	3.53 (1.55, 8.00)	0.0014§
Very good partial response	39 (39.4)	30 (30.9)		
Partial response	8 (8.1)	18 (18.6)		
Stable disease	1 (1.0)	7 (7.2)		
Progressive disease	0	1 (1.0)		

CI, confidence interval.

*The primary analysis occurred on January 25, 2019 (median follow-up, 13.5 months) after all randomized patients completed the post-ASCT disease evaluation or discontinued from study treatment by this time point.

†Mantel-Haenszel estimate of the common odds ratio for stratified tables is used. The stratification factors are ISS stage (I, II, III) and creatinine clearance (CrCl [30-50 mL/min or >50 mL/min]) at randomization. An odds ratio >1 indicates an advantage for the daratumumab group.

‡Responses were assessed according to the IMWG recommendations by computer algorithm (details on the response criteria are provided in Table S1 in the Supplementary Appendix). This analysis included all patients in the response-evaluable population of all randomized patients who had a confirmed diagnosis of MM, measurable disease at baseline, received ≥1 dose of study treatment, and had ≥1 post-baseline disease assessment.

§*P* values were calculated with the use of the Cochran–Mantel–Haenszel chi-square test.

¶A 1-sided *P* value is reported for the primary endpoint (post-consolidation sCR); all other responses were calculated using a 2-sided *P* value not adjusted for multiplicity.

In the RVd arm of the GRIFFIN study, the stringent complete response (sCR) rate by the end of post-ASCT consolidation was 32%. A final analysis of the GRIFFIN trial was presented in 2022, which showed sCR rates for RVd (48.0%) and minimal residual disease (MRD) negativity (next generation sequencing 10^{-5} threshold) reached 30.1%. The estimated 48-month PFS was 70%.[10]

Toxicity

A summary of the toxicities associated with this protocol are included in the table below. The most clinically significant toxicities for this treatment are peripheral neuropathy and haematological adverse events (AEs) (namely neutropenia and lymphopenia). Peripheral neuropathy was reported in 72.5% of patients and was grade 3/4 in 7.8% of patients using RVd in the GRIFFIN study. Haematological grade 3/4 events were common in patients including neutropenia (21.6%), thrombocytopenia (8.8%) and anaemia (5.9%).

Serious adverse events (AEs) were reported in 51% of patients in the RVd arm. The most common were pyrexia (7.8%) and pneumonia (10.8%). 20.6% of patients in the RVd arm discontinued therapy, most commonly due to peripheral neuropathy (3.9%).[5]

Table 2 - GRIFFIN study adverse events[5]

Table 4. Most common adverse events reported during treatment in the safety population*

	D-RVd (n = 99)		RVd (n = 102)	
Adverse event, n (%)	Any Grade	Grade 3/4	Any Grade	Grade 3/4
Hematologic				
Neutropenia	57 (57.6)	41 (41.4)	36 (35.3)	22 (21.6)
Thrombocytopenia	43 (43.4)	16 (16.2)	36 (35.3)	9 (8.8)
Leukopenia	36 (36.4)	16 (16.2)	29 (28.4)	7 (6.9)
Anaemia	35 (35.4)	9 (9.1)	33 (32.4)	6 (5.9)
Lymphopenia	30 (30.3)	23 (23.2)	28 (27.5)	22 (21.6)
Nonhematologic				
Fatigue	68 (68.7)	6 (6.1)	62 (60.8)	6 (5.9)
Upper respiratory tract infection	62 (62.6)	1 (1.0)	45 (44.1)	2 (2.0)
Peripheral neuropathy†	59 (59.6)	7 (7.1)	74 (72.5)	8 (7.8)
Diarrhoea	59 (59.6)	7 (7.1)	51 (50.0)	4 (3.9)
Constipation	51 (51.5)	2 (2.0)	40 (39.2)	1 (1.0)
Cough	50 (50.5)	0	27 (26.5)	0
Nausea	49 (49.5)	2 (2.0)	50 (49.0)	1 (1.0)
Pyrexia	45 (45.5)	2 (2.0)	28 (27.5)	3 (2.9)
Insomnia	42 (42.4)	2 (2.0)	31 (30.4)	1 (1.0)
Back pain	36 (36.4)	1 (1.0)	34 (33.3)	4 (3.9)
Peripheral edema	34 (34.3)	2 (2.0)	35 (34.3)	3 (2.9)
Arthralgia	33 (33.3)	0	33 (32.4)	2 (2.0)
Infusion-related reaction	42 (42.4)	6 (6.1)‡	NA	NA

*The safety analysis population included all randomized patients who received ≥1 dose of study treatment; analysis was according to treatment received. NA denotes not applicable. Adverse events of any grade that are listed are those that occurred in 30% or more of the patients in either group. The safety analysis occurred at a median follow-up of 22.1 months.
†Includes patients with neuropathy peripheral and peripheral sensory neuropathy.
‡There were no grade 4 infusion-related reactions.

References

1 Quach, H., M. H. Prince and S. Harrison on behalf of MSAG. 2022. “Clinical practice guideline multiple myeloma.” Myeloma Foundation of Australia.

2 Quach, H. and M. H. Prince on behalf of MSAG. 2020. “Bortezomib, lenalidomide and dexamethasone (VRd) for initial treatment of multiple myeloma” Myeloma Foundation of Australia.

3 Morgan, G. J., J. A. Child, W. M. Gregory, et al. 2011. "Effects of zoledronic acid versus clodronic acid on skeletal morbidity in patients with newly diagnosed multiple myeloma (MRC Myeloma IX): secondary outcomes from a randomised controlled trial." Lancet Oncol 12(8):743-752.

4 Tinsley, S. M., S. E. Kurtin and J. A. Ridgeway. 2015. "Practical Management of Lenalidomide-Related Rash." Clin Lymphoma Myeloma Leuk 15 Suppl:S64-69.

5 Voorhees, P. M., J. L. Kaufman, J. Laubach, et al. 2020. "Daratumumab, lenalidomide, bortezomib, and dexamethasone for transplant-eligible newly diagnosed multiple myeloma: the GRIFFIN trial." Blood 136(8):936-945.

6 Attal, M., V. Lauwers-Cances, C. Hulin, et al. 2017. "Lenalidomide, Bortezomib, and Dexamethasone with Transplantation for Myeloma." N Engl J Med 376(14):1311-1320.

7 Rosinol, L., A. Oriol, R. Rios, et al. 2019. "Bortezomib, lenalidomide, and dexamethasone as induction therapy prior to autologous transplant in multiple myeloma." Blood 134(16):1337-1345.

8 Roussel, M., V. Lauwers-Cances, N. Robillard, et al. 2014. "Front-line transplantation program with lenalidomide, bortezomib, and dexamethasone combination as induction and consolidation followed by lenalidomide maintenance in patients with multiple myeloma: a phase II study by the Intergroupe Francophone du Myelome." J Clin Oncol 32(25):2712-2717.

9 Okazuka, K., T. Ishida, J. Nashimoto, et al. 2020. "The efficacy and safety of modified bortezomib-lenalidomide-dexamethasone in transplant-eligible patients with newly diagnosed multiple myeloma." Eur J Haematol 104(2):110-115.

10 Sborov, D. W., J. P. Laubach, J. L. Kaufman, et al. 2022. “Analysis of GRIFFIN”. 19th International Myeloma Society Annual

History

Version 2

Date	Summary of changes
13/04/2023	Reviewed at the 2022 eviQ Haematology Reference Committee meeting with the following changes: • Note regarding reduced toxicity with once weekly bortezomib dosing added below treatment schedule • Link to Medical Scientific Advisory Group (MSAG) Clinical Practice Guideline Multiple Myeloma updated • Changed all references of 'i-Access™ program' to 'pregnancy prevention risk management program' • Lenalidomide administration details updated in treatment schedule, administration and patient information • Clinical information block "Bone modifying agents" added • Final analysis of GRIFFIN trial added to evidence Other changes include: • Specific medications removed from G-CSF note in 'Dose modifications' section • Cataract, cough and respiratory tract infection added to side effects Changed to v.2. Review in 2 years.

Version 1

Date	Summary of changes
27/09/2021	New protocol developed out of session and approved for publication. For review in 1 year.
21/12/2021	Changed antiemetic clinical information block to minimal or low, to align with new categories. See ID 7 Prevention of anti-cancer therapy induced nausea and vomiting (AINV) v5.
24/01/2022	Pulmonary toxicity added to side effects.

First approved: 27 September 2021
Last reviewed: 14 October 2022
Review due: 31 December 2024

The currency of this information is guaranteed only up until the date of printing, for any updates please check:
https://www.eviq.org.au/p/3918
14 Jun 2023

Patient information - Multiple myeloma - Consolidation RVd (lenalidomide bortezomib dexamethasone) GRIFFIN

Patient's name:

Your treatment

The treatment schedule below explains how the drugs for this treatment are given.

Consolidation RVd (lenalidomide, bortezomib, dexamethasone) GRIFFIN			
This treatment cycle is repeated every 21 days. You will usually have 2 cycles after your stem cell transplant. Your doctor will advise you of the number of treatments you will have.			
Day	**Treatment**	**How it is given**	**How long it takes**
1, 2, 8, 9, 15 and 16	**Dexamethasone** (*dex-a-METH-a-sone*)	Take orally ONCE a day in the morning with food on day 1, 2, 8, 9, 15 and 16 only.	
1 to 14	**Lenalidomide** *(len-a-lid-o-mide)*	Take orally ONCE a day on days 1 to 14 at the same time every day. Take either with or without food. Swallow whole, do not break, open, chew or crush capsules.	
1, 4, 8 and 11	**Bortezomib** (*bore-TEZ-oh-mib*)	By injection under the skin	About 5 minutes

Missed doses:

- **Dexamethasone:** if you forget to take your tablets or vomit your tablets, contact your treating team.
- **Lenalidomide:** if you forget to take a capsule and if it is less than 12 before your next dose, skip that dose and take your normal dose at the next time it is due. Do not take an extra dose.

When to get help

Anticancer drugs (drugs used to treat cancer) can sometimes cause serious problems. It is important to get medical help immediately if you become unwell.

IMMEDIATELY go to your nearest hospital Emergency Department, or contact your doctor or nurse if you have any of the following at any time:	**Emergency contact details** Ask your doctor or nurse from your treating team who to contact if you have a problem
• a temperature of 38ºC or higher • chills, sweats, shivers or shakes • shortness of breath • uncontrolled vomiting or diarrhoea • pain, tingling or discomfort in your chest or arms • you become unwell.	Daytime: Night/weekend: Other instructions:

During your treatment immediately tell the doctor or nurse looking after you if you get any of the following problems:

- pain, stinging, swelling or redness around the injection site
- a skin rash, itching, feeling short of breath, wheezing, fever, shivers, or feeling dizzy or unwell in any way (allergic reaction).

Important information about taking lenalidomide

Lenalidomide is only available under a restricted distribution pregnancy prevention risk management program. You, your doctor and your pharmacist must be registered and comply with conditions of the pregnancy prevention risk management program.

Lenalidomide can cause major birth defects to an unborn baby. Lenalidomide must not be taken if you are pregnant. Contraception **must** be used while you are being treated with lenalidomide.

- **If you are a male patient and your female partner is of child-bearing potential** you **must** use a barrier method of contraception (e.g. condoms) while taking lenalidomide and for one week after finishing lenalidomide treatment.
- **If you are a woman of child-bearing potential (a patient or a partner of a patient)** you **must** use at least one effective method of contraception during treatment with lenalidomide. You should start using contraception four weeks before taking lenalidomide and continue for four weeks after finishing lenalidomide treatment. It is important that you discuss appropriate contraception with your doctor.

If you become pregnant while taking lenalidomide you must stop the treatment and tell your doctor immediately. If you are a male patient and your female partner becomes pregnant during your treatment you must inform your doctor immediately.

Other information about your treatment

Changes to your dose or treatment delays

Sometimes a treatment may be started at a lower dose or the dose needs to be changed during treatment. There may also be times when your treatment is delayed. This can happen if your doctor thinks you are likely to have severe side effects, if you get severe side effects, if your blood counts are affected and causing delays in treatment, or if you are finding it hard to cope with the treatment. This is called a dose reduction, dose change or treatment delay. Your doctor will explain if you need any changes or delays to your treatment and the reason why.

Blood tests and monitoring

Anti-cancer drugs can reduce the number of blood cells in your body. You will need to have regular blood tests to check that your blood cell count has returned to normal. If your blood count is low, your treatment may be delayed until it has returned to normal. Your doctor or nurse will tell you when to have these blood tests.

Other medications given during this treatment

- **Anti-sickness (anti-nausea) medication:** you may be given some anti-sickness medication. Make sure you take this medication as your doctor or nurse tells you, even if you don't feel sick. This can help to prevent the sickness starting.
- **Blood clot prevention medication:** you may be given low dose aspirin or daily injections of a drug called enoxaparin to prevent blood clots. Your doctor will decide if you need this medication.
- **Prophylaxis medication:** you may need to take some medications to prevent infection and to help prevent or reduce some of the side effects of the chemotherapy. Your doctor or nurse will tell you how and when to take these medications.
- **G-CSF:** you may be given injection(s) of a drug called G-CSF (also called filgrastim, lipegfilgrastim or pegfilgrastim) under your skin. This helps to boost your white blood cell count. Your white blood cells help to fight infection. Lipegfilgrastim and pegfilgrastim are given once. Filgrastim is given for several days until your white blood cells recover. Your doctor will decide if you need this medication.

Side effects

Cancer treatments can cause damage to normal cells in your body, which can cause side effects. Everyone gets different side effects, and some people will have more problems than others.

The table below shows some of the side effects you may get with this treatment. You are unlikely to get all of those listed and you

may also get some side effects that have not been listed.

Tell your doctor or nurse about any side effects that worry you. Follow the instructions below and those given to you by your doctor or nurse.

Immediate (onset hours to days)	
Low blood pressure (hypotension)	• You may get low blood pressure from the drug bortezomib. • You may feel dizzy or light-headed. • Tell your doctor if you are taking blood pressure medication. • Your doctor will monitor your blood pressure regularly while you are on this treatment. • Drink plenty of fluids (unless you are fluid restricted), especially before each dose of bortezomib. • When you want to get up from a sitting or lying down position, get up slowly to let your body adjust to the new position. • Do not drive or operate machinery if you feel dizzy or light-headed. • Tell your doctor or nurse if you get any of the signs or symptoms listed above.
Nausea and vomiting	• You may feel sick (nausea) or be sick (vomit). • Take your anti-sickness medication as directed even if you don't feel sick. • Drink plenty of fluids (unless you are fluid restricted). • Eat small meals more frequently. • Try food that does not require much preparation. • Try bland foods like dry biscuits or toast. • Gentle exercise may help with nausea. • Ask your doctor or nurse for eviQ patient information - Nausea and vomiting during cancer treatment. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you have uncontrolled vomiting or feel dizzy or light-headed.**
Taste and smell changes	• You may find that food loses its taste or tastes different. • These changes are likely to go away with time. • Do your mouth care regularly. • Chew on sugar-free gum or eat sugar-free mints. • Add flavour to your food with sauces and herbs. • Ask your doctor or nurse for eviQ patient information - Taste and smell changes during cancer treatment.
Early (onset days to weeks)	

Infection risk (neutropenia)	• This treatment lowers the amount of white blood cells in your body. The type of white blood cells that help to fight infection are called neutrophils. Having low level of neutrophils is called neutropenia. If you have neutropenia, you are at greater risk of getting an infection. It also means that your body can't fight infections as well as usual. This is a serious side effect, and can be life threatening. • Wash your hands often. • Keep a thermometer at home and take your temperature regularly, and if you feel unwell. • Do your mouth care regularly. • Inspect your central line site (if you have one) daily for any redness, pus or swelling. • Limit contact with people who are sick. • Learn how to recognise the signs of infection. • Ask your doctor or nurse for eviQ patient information - Infection during cancer treatment. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you get any of the following signs or symptoms:** ◦ **a temperature of 38°C or higher** ◦ **chills, shivers, sweats or shakes** ◦ **a sore throat or cough** ◦ **uncontrolled diarrhoea** ◦ **shortness of breath** ◦ **a fast heartbeat** ◦ **become unwell even without a temperature.**
Low platelets (thrombocytopenia)	• This treatment lowers the amount of platelets in your body. Platelets help your blood to clot. When they are low, you are at an increased risk of bleeding and bruising • Try not to bruise or cut yourself. • Avoid contact sport or vigorous exercise. • Clear your nose by blowing gently. • Avoid constipation. • Brush your teeth with a soft toothbrush. • For minor pain take paracetamol. Do not take any medications containing aspirin or ibuprofen without talking to your doctor or nurse. • **Tell your doctor or nurse immediately, or go to your nearest hospital Emergency Department if you have any uncontrolled bleeding.**
Blood clots (thromboembolism)	• Blood clots can occur with this treatment. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you get any of the following signs or symptoms:** ◦ **redness, heat or pain in your leg(s)** ◦ **numbness or weakness in your face, arm or leg** ◦ **chest pain** ◦ **sudden shortness of breath** ◦ **dizziness** ◦ **trouble speaking** ◦ **blurred vision** ◦ **severe headache** ◦ **unexplained falls or loss of balance.**
Joint and muscle pain and stiffness	• You may get muscle, joint or general body pain and stiffness. • Applying a heat pack to affected areas may help. • Talk to your doctor or nurse about other ways to manage these symptoms. You may need medication to help with any pain.

Constipation	• You may have bowel motions (stools, poo) that are less frequent, harder, smaller, painful or difficult to pass. • You may also get: ◦ bloating, cramping or pain ◦ a loss of appetite ◦ nausea or vomiting. • Drink plenty of fluids (unless you are fluid restricted). • Eat plenty of fibre-containing foods such as fruit, vegetables and bran. • Take laxatives as directed by your doctor. • Try some gentle exercise daily. • **Tell your doctor or nurse if you have not opened your bowels for more than 3 days.**
Cough	• Some people who receive this treatment develop a cough • Tell your doctor or nurse if you develop a cough
Diarrhoea	• You may get bowel motions (stools, poo) that are more frequent or more liquid. • You may also get bloating, cramping or pain. • Take your antidiarrhoeal medication as directed by your doctor. • Drink plenty of fluids (unless you are fluid restricted). • Eat and drink small amounts more often. • Avoid spicy foods, dairy products, high fibre foods, and coffee. • Ask your doctor or nurse for eviQ patient information - Diarrhoea during cancer treatment. • **Tell your doctor or nurse immediately, or go to your nearest hospital Emergency Department if your diarrhoea is not controlled, you have 4 or more loose bowel motions per day, and if you feel dizzy or light-headed.**
Tiredness and lack of energy (fatigue)	• You may feel very tired, have no energy, sleep a lot, and not be able to do normal activities or things you enjoy. • Do not drive or operate machinery if you are feeling tired. • Nap for short periods (only 1 hour at a time) • Prioritise your tasks to ensure the best use of your energy. • Eat a well balanced diet and drink plenty of fluids (unless you are fluid restricted). • Try some gentle exercise daily. • Allow your friends and family to help. • **Tell your doctor or nurse if you get any of the symptoms listed above.**
Nerve damage (peripheral neuropathy)	• You may notice a change in the sensations in your hands and feet, including: ◦ tingling or pins and needles ◦ numbness or loss of feeling ◦ pain. • You may find it difficult to do everyday activities, such as doing up buttons or picking up small objects. • Test water temperature with your elbow when bathing to avoid burns. • Use rubber gloves, pot holders and oven mitts in the kitchen. • Wear rubber shoes or boots when working in the garden or garage. • Keep rooms well lit and uncluttered. • Ask your doctor or nurse for eviQ patient information – Nerve problems during cancer treatment. • Tell your doctor or nurse if you get any of the symptoms listed above.
Chest infection	• You can develop a chest infection whilst receiving this treatment. • **Tell your doctor or nurse as soon as possible if you get any of the following symptoms:** ◦ **shortness of breath** ◦ **difficulty breathing** ◦ **wheezing** ◦ **coughing up mucus**

Side effects from steroid medication	• Steroid medication may cause:
	  ◦ mood swings and behaviour changes
	  ◦ an increased appetite
	  ◦ weight gain
	  ◦ swelling in your hands and feet
	  ◦ stomach upsets
	  ◦ trouble sleeping
	  ◦ fragile skin and bruising
	  ◦ an increase in your blood sugar level
	  ◦ weak and brittle bones (osteoporosis)
	• Take your steroid medication with food to reduce stomach upset
	• If you have diabetes, your blood sugar levels may be tested more often.
	• Tell your doctor or nurse if you get any of the symptoms listed above.

Skin rash	• You may get a red, bumpy rash and dry, itchy skin. • Moisturise your skin with a gentle non-perfumed moisturising cream like sorbolene or aqueous cream. • Do not scratch your skin. • Protect your skin from the sun by wearing sun-protective clothing, a wide-brimmed hat, sunglasses and sunscreen of SPF 50 or higher. • **Talk to your doctor or nurse about other ways to manage your skin rash.**

Late (onset weeks to months)	
Low red blood cells (anaemia)	• You may feel dizzy, light-headed, tired and appear more pale than usual. • Tell your doctor or nurse if you have any of these signs or symptoms. You might need a blood transfusion. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you have any chest pain, trouble breathing, or feel like your heart is racing.**
Diarrhoea (late onset)	• Whilst usually mild and easily manageable, bowel motions (stools, poo) that are more frequent or more liquid may persist during treatment with lenalidomide. • Bile acid malabsorption (BAM), a condition in which patients do not absorb bile acids properly from their intestines, can be a cause of persistent diarrhoea in patients taking lenalidomide. • It can be treated by making some dietary changes such as making sure that fat does not make up more than 20% of the diet. • Your doctor will recommend if treatment is necessary for your diarrhoea • Drink plenty of fluids (unless you are fluid restricted). • Ask your doctor or nurse for eviQ patient information - Diarrhoea during cancer treatment. • **Tell your doctor or nurse immediately, or go to your nearest hospital Emergency Department if your diarrhoea is not controlled, you have 4 or more loose bowel motions per day, and if you feel dizzy or light-headed.**
Slow thyroid gland (hypothyroidism)	• You may: ◦ fatigue and low energy levels ◦ depression ◦ slow heart rate ◦ unexplained weight gain ◦ intolerance to cold temperatures ◦ fatigued and aching muscles ◦ dry, coarse skin ◦ puffy face ◦ hair loss ◦ constipation ◦ problems with concentration • You will have regular blood tests to check how well your thyroid is working • **Tell your doctor or nurse if you get any of the symptoms listed above.**
Muscle cramps	• You may get muscle cramps, usually in the hands, calves and thighs. • Tell your doctor or nurse if you get any of these symptoms. Your doctor may prescribe you medication for this.
Stevens-Johnson syndrome (SJS)	• This side effect is rare, but can be very serious. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you get any of the following symptoms:** ◦ **flu-like symptoms, then a painful red or purple rash that spreads** ◦ **swelling of the face or tongue** ◦ **painful or peeling skin** ◦ **blisters on the skin, mouth, nose, eyes and genitals.**

Delayed (onset months to years)	
Cataract	• Tell your doctor or nurse if you notice any changes to your eyes, including blurred vision.
Lung problems	• Lung problems are rare, but can be serious. They may occur throughout treatment or after the completion of treatment. • You may get: ◦ shortness of breath ◦ fever ◦ dry cough ◦ wheezing ◦ fast heartbeat ◦ chest pain. • Your doctor will monitor how well your lungs are working during your treatment. • **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you have chest pain or become short of breath.**

General advice for people having cancer treatment

Chemotherapy safety

- Learn how to keep you and your family safe while you are having anticancer drugs.
- See our patient information sheet - Chemotherapy safety at home.

Blood clot risk

- Cancer and anticancer drugs can increase the risk of a blood clot (thrombosis).
- Tell your doctor if you have a family history of blood clots.
- A blood clot can cause pain, redness, swelling in your arms or legs, shortness of breath or chest pain.
- If you have any of these symptoms go to your nearest hospital Emergency Department.

Medications and vaccinations

- Before you start treatment, tell your doctor about any medications you are taking, including vitamins or herbal supplements.
- Don't stop or start any medications during treatment without talking to your doctor and pharmacist first.
- You should not take any products containing vitamin C or green tea while you are having this treatment, they may make your treatment less effective.
- Paracetamol is safe to take if you have a headache or other mild aches and pains. It is recommended that you avoid taking aspirin, ibuprofen and other anti-inflammatory type medications for pain while you are having treatment. However, if these medications have been prescribed by your doctor, do not stop taking them without speaking with your doctor.
- Vaccinations such as flu and tetanus vaccines are safe to receive while having treatment. Do not have any live vaccines during your treatment or for 6 months after it finishes. If you are unsure, check with your doctor before you have any vaccinations.
- People you live with should be fully vaccinated, including having live vaccines according to the current vaccination schedule. Extra care needs to be taken with hand washing and careful disposal of soiled nappies for infants who have recently received the rotavirus vaccine.

Other medical and dental treatment

- If you go to hospital or any other medical appointment (including dental appointments), always tell the person treating you that you are receiving anticancer drugs.
- Before you have any dental treatment, talk to your doctor.

Diet and food safety

- While you are receiving this treatment, it is important that you try to maintain a healthy diet.
- Grapefruit and grapefruit juice can interact with your medication and should be avoided while you are on this treatment.
- Speak to your doctor or nurse about whether drinking alcohol is safe with your treatment.
- If you have any concerns about recent weight loss or weight gain or questions about your diet, ask to speak to a dietitian.
- There are some foods that may cause infection in high risk individuals and should be avoided. For further information on foods to avoid and food hygiene please ask for a copy of the Listeria and food brochure.

Fertility

- Some cancer treatments can reduce your fertility. This can make it difficult or impossible to get pregnant or father a child.
- Talk to your doctor or nurse before you start any treatment. Depending on your situation there may be fertility sparing options available to you and/or your partner, discuss these with your doctor or nurse.

Pregnancy and breastfeeding

- This treatment can cause major congenital disabilities or death to unborn babies. Talk to your doctor or nurse if you think there is any chance that you could be pregnant.
- Do not try to get pregnant or father a child during this treatment. You must use contraception while having this treatment and after stopping treatment, see the "Important information" section above for more information. Ask your doctor or nurse about what type of contraception you should use.
- If you are planning pregnancy/fatherhood after completing this treatment, talk to your doctor. Some doctors advise waiting between 6 months and 2 years after treatment.
- Do not breastfeed if you are on this treatment, as anti-cancer medications can also pass into breast milk.

Sex life and sexuality

- The desire to have sex may decrease as a result of this treatment or its side effects.
- Your emotions and the way you feel about yourself may also be affected by this treatment.
- It may help to discuss your concerns with your partner and doctor or nurse.

Quitting smoking

- It is never too late to quit smoking. Quitting smoking is one of the best things you can do to help your treatment work better.
- There are many effective tools to improve your chances of quitting.
- Talk to your treating team for more information and referral to a smoking cessation support service.

Staying active

- Research shows that exercise, no matter how small, has many benefits for people during and after cancer treatment.
- Talk to your doctor before starting an exercise program. Your doctor can advise whether you need a modified exercise program.

For more information about cancer treatment, side effects and side effect management see our Patient and carers section.

Where to get more information

Telephone support

- Call Cancer Council on 13 11 20 for cancer information and support
- Call the Leukaemia Foundation on 1800 620 420 (Mon to Fri 9am – 5pm)
- Call the Lymphoma Nurse Support Line on 1800 953 081 (Mon to Fri 9am - 5pm)

Haematology, transplant and cellular therapy information

- Arrow bone marrow transplant foundation – arrow.org.au
- Australasian Menopause Society – menopause.org.au
- Chris O'Brien Lifehouse - Total Body Irradiation - mylifehouse.org.au/departments/radiation-oncology/total-body-irradiation/
- Healthy Male Andrology Australia – healthymale.org.au/
- International Myeloma Foundation – myeloma.org
- Leukaemia Foundation – leukaemia.org.au
- Lymphoma Australia – lymphoma.org.au
- Myeloma Australia – myeloma.org.au
- NSW Agency for Clinical Innovation, Blood & Marrow Transplant Network – aci.health.nsw.gov.au/resources/blood-and-marrow-transplant
- NSW Agency for Clinical Innovation - aci.health.nsw.gov.au/projects/immune-effector-cell-service
- NCCN Guidelines for Patients Immunotherapy Side Effects: CAR T-Cell Therapy - nccn.org/patientresources/patient-resources/guidelines-for-patients
- Talk Blood Cancer – cmlsupport.org.uk/organisation-type/social-media-groups

General cancer information and support

- Australian Rare Cancer (ARC) Portal – arcportal.org.au/

- Beyondblue – beyondblue.org.au
- Cancer Australia – canceraustralia.gov.au
- Cancer Council Australia – cancer.org.au
- Cancer Voices Australia – cancervoicesaustralia.org
- CanTeen – canteen.org.au
- Carers Australia – carersaustralia.com.au
- eviQ Cancer Treatments Online – eviQ.org.au
- Food Standards Australia New Zealand: Listeria & Food Safety – foodstandards.gov.au/publications/pages/listeriabrochuretext.aspx
- LGBTQI+ People and Cancer - cancercouncil.com.au/cancer-information/lgbtqi
- Look Good Feel Better – lgfb.org.au
- Patient Information - patients.cancer.nsw.gov.au
- Radiation Oncology Targeting Cancer - targetingcancer.com.au
- Redkite – redkite.org.au
- Return Unwanted Medicines – returnmed.com.au
- Staying active during cancer treatment – patients.cancer.nsw.gov.au/coping-with-cancer/physical-wellbeing/staying-active

Quit smoking information and support

Quitting smoking is helpful even after you have been diagnosed with cancer. The following resources provide useful information and support to help you quit smoking. Talk to your treating team about any other questions you may have.

- Call Quitline on 13 QUIT (13 78 48)
- iCanQuit – iCanQuit.com.au
- Patient Information - patients.cancer.nsw.gov.au/coping-with-cancer/physical-wellbeing/quitting-smoking
- Quitnow – quitnow.gov.au

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