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

Link to Medical Scientific Advisory Group (MSAG) Clinical Practice Guideline 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.

### International Consensus Guideline for Anticancer Drug Dosing in Kidney Dysfunction (ADDIKD)

2022

---

**Treatment schedule - Overview**

**Cycle 1 and further cycles**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Route</th>
<th>Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pamidronate</td>
<td>90 mg</td>
<td>IV infusion</td>
<td>1</td>
</tr>
</tbody>
</table>

**Frequency:** 21 to 28 days  
**Cycles:** Continuous  
**Drug status:** Pamidronate: (PBS authority)  
**Cost:** ~ $80 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 further cycles**

<table>
<thead>
<tr>
<th>Day 1</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>500 mg (PO)</td>
<td>ONCE a day (daily oral supplement of at least calcium 500 mg is required)</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>400 International Units (PO)</td>
<td>ONCE a day (daily oral supplement of at least vitamin D 400 international units is required)</td>
</tr>
<tr>
<td>Pamidronate</td>
<td>90 mg (IV infusion)</td>
<td>in 500 mL sodium chloride 0.9% over 2 to 4 hours</td>
</tr>
</tbody>
</table>

| Day 2 to 28                   |                     |               |
| Calcium                       | 500 mg (PO)         | ONCE a day (daily oral supplement of at least calcium 500 mg is required) |
**Indications and patient population**

**Indications:**
- Multiple myeloma with evidence of lytic disease on plain X-ray
- Multiple myeloma with osteopenia but no radiographic evidence of lytic bone disease

**Not recommended for:**
- Smouldering myeloma
- Monoclonal gammopathy of unknown significance (MGUS)
- Solitary plasmacytoma.

**Clinical information**

<table>
<thead>
<tr>
<th>Venous access required</th>
<th>IV cannula (IVC) or central venous access device (CVAD) is required to administer this treatment. Read more about <a href="#">central venous access device line selection</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisphosphonates and dental review</td>
<td>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 <a href="#">medication-related osteonecrosis of the jaw (MRONJ)</a></td>
</tr>
<tr>
<td>Electrolyte imbalances</td>
<td>If hypocalcaemia, hypophosphataemia or hypomagnesaemia occurs short term supplemental therapy may be necessary. Patients who have undergone thyroid surgery may be particularly susceptible to developing hypocalcaemia due to relative hypoparathyroidism. Severe electrolyte imbalances may require hospital admission and aggressive intravenous replacement. Daily oral supplements of at least calcium 500 mg and vitamin D 400 International Units is required (unless contraindicated) for the duration of the therapy.</td>
</tr>
<tr>
<td>Length of treatment</td>
<td>Annual review of need for bisphosphonate therapy recommended after 2 years. If responsive or stable disease, bisphosphonates may be ceased. Bisphosphonates should be resumed upon relapse or onset of new skeletal-related events.</td>
</tr>
<tr>
<td>Blood tests</td>
<td>EUC, calcium, magnesium and phosphate at baseline and prior to each treatment.</td>
</tr>
<tr>
<td>Vaccinations</td>
<td>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 <a href="#">Australian Immunisation Handbook</a>. Read more about <a href="#">COVID-19 vaccines and cancer</a>.</td>
</tr>
</tbody>
</table>

**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.

### Renal impairment

<table>
<thead>
<tr>
<th>Baseline creatinine clearance (mL/min)</th>
<th>Recommended dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild to moderate renal impairment</td>
<td>Slow infusion of 90 mg over 4 hours*</td>
</tr>
<tr>
<td>Severe renal impairment</td>
<td>Not recommended</td>
</tr>
</tbody>
</table>

Treatment should be withheld for deterioration in renal function (increase of serum creatinine greater than 45 micromol/L in patients with normal baseline (serum creatinine less than 125 micromol/L) or increase of serum creatinine greater than 90 micromol/L in patients with abnormal baseline). Resumption of therapy may be considered when serum creatinine returns to within 10% of baseline.

* Longer infusion times (greater than 2 hours) may reduce the risk for renal toxicity, especially in patients with pre-existing renal insufficiency. The manufacturer recommends infusing over 4 hours for osteolytic bone lesions with multiple myeloma. The ASCO guidelines for bisphosphonate use in multiple myeloma recommend infusing pamidronate over at least 2 hours; if therapy is withheld due to renal toxicity, infuse over at least 4 hours upon reintroduction of treatment after renal recovery.

### Hepatic impairment

| Mild to moderate hepatic impairment | Limited clinical data. Until further experience is gained, a maximum infusion rate of 20 mg/hour is recommended in patients with mild to moderate hepatic impairment. |
| Severe hepatic impairment | No data in severe hepatic impairment therefore no specific recommendations |

### 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

### Pamidronate

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Clinical management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thalidomide</td>
<td>Increased risk of renal dysfunction</td>
</tr>
<tr>
<td>Anti-angiogenic drugs (e.g. sunitinib, bevacizumab)</td>
<td>Increased risk of osteonecrosis of the jaw</td>
</tr>
<tr>
<td>Nephrotoxic drugs (e.g. aminoglycosides, amphotericin, cisplatin, contrast dye, frusemide, NSAIDs)</td>
<td>Additive nephrotoxicity</td>
</tr>
<tr>
<td>Drugs that may cause hypocalcaemia (e.g. other bisphosphonates, cinacalcet, phenytoin etc.)</td>
<td>Additive effect with pamidronate</td>
</tr>
</tbody>
</table>
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: 2.5 to 4.5 hours

Safe handling and waste management (reproductive risk only)

Safe administration

General patient assessment prior to each day of treatment.

Prime IV line(s).

Insert IV cannula or access TIVAD or CVAD.

○ Treatment - Time out

Pamidronate infusion

Prior to administration:

• ensure creatinine has been checked
• ensure patient is adequately hydrated

Administer pamidronate:

• via IV infusion over 2 to 4 hours
• flush with ~ 50 mL of sodium chloride 0.9%.

Remove IV cannula and/or deaccess TIVAD or CVAD.

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

Discharge information

Supplements

• Daily oral supplements of calcium 500 mg and vitamin D 400 International Units are recommended.

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.

<table>
<thead>
<tr>
<th>Immediate (onset hours to days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flu-like symptoms</td>
</tr>
<tr>
<td>Headache</td>
</tr>
</tbody>
</table>
## Early (onset days to weeks)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
<th>Read more about...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthralgia and myalgia</td>
<td>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.</td>
<td>arthralgia and myalgia</td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
<td>fatigue</td>
</tr>
</tbody>
</table>

## Delayed (onset months to years)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
<th>Read more about...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteonecrosis of the jaw (ONJ)</td>
<td>Exposed, necrotic bone in the maxillofacial region is associated with IV bisphosphonates and denosumab. It can persist for more than 8 weeks.</td>
<td>medication-related osteonecrosis of the jaw</td>
</tr>
</tbody>
</table>

## Evidence

The efficacy of bisphosphonates in multiple myeloma was initially evaluated in a study in which 377 patients with stage III multiple myeloma and at least one lytic lesion were treated with antimyeloma therapy plus either placebo or pamidronate (90 mg) as a four-hour intravenous infusion given every four weeks for nine cycles.\(^1\) The proportion of patients who had any skeletal events (pathologic fracture, irradiation of or surgery on bone, and spinal cord compression) was significantly lower in the pamidronate group (24 versus 41 percent). Pamidronate therapy was also associated with a significant reduction in bone pain. Others have noted the rapidity of onset of analgesia with intravenous pamidronate inpatients with symptomatic bone metastases (approximately one week).\(^2\)

A later report from the same investigators extended the evaluation to 21 cycles of therapy.\(^3\) The use of pamidronate was associated with a significantly lower number of skeletal events per patient per year (1.3 versus 2.2 with placebo). There was no improvement in overall survival in the pamidronate group except for patients who also received second-line antimyeloma therapy (14 versus 21 months). These benefits appeared to be associated with reduced bone marrow plasmacytosis.\(^4\)

## References


## Bibliography


DURIE B, Katz M, McCoy J, Crowley J. 2004 "Osteonecrosis of the jaws in myeloma: time dependent correlation with Aredia..."
The information contained in this protocol is based on the highest level of available evidence and consensus of the eviQ reference committee regarding their views of currently accepted approaches to treatment. Any clinician (medical oncologist, haematologist, radiation oncologist, medical physicist, radiation therapist, pharmacist or nurse) seeking to apply or consult this protocol is expected to use independent clinical judgement in the context of individual clinical circumstances to determine any patient's care or treatment. While eviQ endeavours to link to reliable sources that provide accurate information, eviQ and the Cancer Institute NSW do not endorse or accept responsibility for the accuracy, currency, reliability or correctness of the content of linked external information sources. Use is subject to eviQ’s disclaimer available at www.eviQ.org.au

History

Version 4

<table>
<thead>
<tr>
<th>Date</th>
<th>Summary of changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>08/09/2009</td>
<td>Reviewed and transferred to eviQ</td>
</tr>
<tr>
<td>02/07/2010</td>
<td>Calculator removed</td>
</tr>
<tr>
<td>07/12/2011</td>
<td>New format to allow for export of protocol information</td>
</tr>
<tr>
<td></td>
<td>Protocol version number changed to V.2</td>
</tr>
<tr>
<td></td>
<td>Antiemetics and premedications added to the treatment schedule</td>
</tr>
<tr>
<td></td>
<td>Additional Clinical Information, Key Prescribing table and Key Administration table combined into new section titled Clinical Considerations</td>
</tr>
<tr>
<td></td>
<td>Drug specific information placed behind the drug name link</td>
</tr>
<tr>
<td>6/3/2012</td>
<td>PHC view added</td>
</tr>
<tr>
<td>23/05/2012</td>
<td>Calcium and vitamin D added to the treatment schedule</td>
</tr>
<tr>
<td>21/04/2015</td>
<td>Standard review- no major changes. Review in 2 years.</td>
</tr>
<tr>
<td>31/05/2017</td>
<td>Transferred to new eviQ website. Version number change to V.4.</td>
</tr>
<tr>
<td>24/11/2017</td>
<td>Standard review- no major changes. Review in 5 years.</td>
</tr>
<tr>
<td>30/04/2021</td>
<td>Reviewed electronically, no changes. Review in 4 years.</td>
</tr>
</tbody>
</table>

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13 Jun 2023

Multiple myeloma pamidronate
Pamidronate is not chemotherapy. It is used to slow down the spread of cancer in the bones and help to prevent changes to the bones that can make them weak.

The treatment schedule below explains how the drug for this treatment is given.

**Your treatment**

Pamidronate

<table>
<thead>
<tr>
<th>Day</th>
<th>Treatment</th>
<th>How it is given</th>
<th>How long it takes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pamidronate <em>(pa-mi-DROE-nate)</em></td>
<td>By a drip into a vein</td>
<td>About 4 hours</td>
</tr>
</tbody>
</table>

**When to get help**

**Emergency contact details**

Ask your doctor or nurse from your treating team when you should get help and who to contact if you have a problem

**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).

**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
You will need to have a blood test before you start treatment and regularly throughout your treatment. Your doctor or nurse will tell you when to have these blood tests.

Other medications given during this treatment
- **Calcium and vitamin D supplements**: you may be given some calcium and vitamin D tablets. Your doctor or nurse will tell you how and when to take these.

---

### 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.

<table>
<thead>
<tr>
<th>Immediate (onset hours to days)</th>
</tr>
</thead>
</table>
| **Flu-like symptoms** | You may get:  
  - a fever  
  - chills or sweats  
  - muscle and joint pain  
  - a cough  
  - headaches.  
  - Tell your doctor or nurse if you get any of the symptoms listed above.  
  - **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you have a temperature of 38°C or higher.**  
| **Headache** | You can take paracetamol if you have a headache.  
  - **Tell your doctor or nurse immediately, or go to the nearest hospital Emergency Department if you get a very bad headache that is not helped by pain medication.**  

<table>
<thead>
<tr>
<th>Early (onset days to weeks)</th>
</tr>
</thead>
</table>
| **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.  
| **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.**  

### Jaw problems (osteonecrosis of the jaw)

- You may get the following signs or symptoms during treatment, or after you have stopped treatment:
  - pain, swelling or infection in the gums
  - loosening of teeth
  - numbness or heaviness in the jaw
  - poor healing of gums and sockets, especially after dental treatment
- Do your mouth care regularly.
- See a dentist before you begin treatment and then for 6 monthly check ups.
- Make sure you tell your dentist that you are starting treatment with a bisphosphonate or denosumab.
- If you need a tooth removed, talk to your doctor first, as you will need to stop treatment 6 to 8 weeks before the dental work. Only start treatment again when the tooth socket has healed.
- **Tell your doctor or dentist immediately if you get any of the symptoms listed above.**

### General advice for people having cancer treatment

#### 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.
- Vaccinations such as flu and tetanus vaccines are safe to receive while you are having treatment. If you are unsure, check with your doctor before you have any vaccinations.

#### 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
- While you are receiving this treatment it is important that you try to maintain a healthy diet.
- 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.

#### Pregnancy and breastfeeding
- Some cancer treatments can be dangerous 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. Contraception should be used during treatment and after stopping treatment. 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

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Patient information - Multiple myeloma - Pamidronate
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
- 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
- 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 – cancervoiceasa.org
- CanTeen – canteen.org.au
- Carers Australia – carersaustralia.com.au
- eviQ Cancer Treatments Online – eviQ.org.au
- 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

**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.
This document is a guide only and cannot cover every possible situation. The health professionals caring for you should always consider your individual situation when making decisions about your care. Contact your cancer clinic staff or doctor if you have any questions or concerns about your treatment, or you are having problems coping with side effects. While eviQ endeavours to link to reliable sources that provide accurate information, eviQ and the Cancer Institute NSW do not endorse or accept responsibility for the accuracy, currency, reliability or correctness of the content of linked external information sources. Use of this document is subject to eviQ's disclaimer available at www.eviQ.org.au

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