PRINCESS MARGARET CANCER CENTRE
CLINICAL PRACTICE GUIDELINES

LEUKEMIA

ACUTE MYELOID LEUKEMIA
Leukemia Site Group – Acute Myeloid Leukemia (AML)

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1. Introduction
These guidelines relate to the management of AML as currently practiced at Princess Margaret Hospital.

The Acute Promyelocytic Leukemia (APL) subtype of AML is considered in a separate document.

2. Prevention
Preventive strategies are generally not available for AML.

However, heightened awareness and ongoing surveillance, as appropriate, may be considered in specific situations (see 3. below).

3. Screening and Early Detection
Screening and Early Detection is generally not relevant in AML.

However, heightened awareness and ongoing surveillance, as appropriate, may be considered in specific clinical settings associated with the development of AML. These include the treatment of other malignancies with chemotherapy - and in particular, with alkylating agents and with topoisomerase II inhibitors, and with radiotherapy; and “pre-leukemic” conditions such as myelodysplastic syndromes (MDS), and myeloproliferative neoplasms (MPNs).

4. Diagnosis
The comprehensive diagnosis of AML is based on the examination of the peripheral blood and bone marrow both morphologically and by flow-cytometry +/- immunocyto- and immunohistochemical studies, as appropriate, and by additional cytogenetic and molecular studies, ideally performed on the bone marrow.

In cases in which bone marrow aspiration yields an adequate sample, additional bone marrow biopsy, while complementary, is not essential for diagnosis. In cases in which the aspirate is unsuccessful or inadequate, however, biopsy is essential. Bone marrow biopsy is also considered essential in cases that may involve MDS, MPNs, or aplastic anemia (AA).

The peripheral blood and marrow blast % divides patients into AML vs. MDS. In the various iterations of the FAB classification (see 5. below), up to 30% marrow blasts constitute MDS. In the more recent WHO classification (see 5. below), the MDS/AML cutoff is 20% blasts.

5. Pathology
Hematopathology (including flow cytometry), cytogenetics, and molecular studies contribute to the comprehensive diagnosis of AML.
5i. Hematopathology

- Morphology
- Cytochemistry
- Immunophenotype
- Cytogenetics

M1 AML, minimal myeloid maturation
M2 AML, with maturation
M3 Promyelocytic
M4 Myelomonocytic
M5 Monocytic
M6 Erythroleukemia
M7 Megakaryoblastic

However, the FAB classification does not adequately reflect the biological heterogeneity of AML. In particular, it does not adequately reflect the newer molecular genetic understanding of AML, and the variable pathogenesis and development of AML (i.e. de novo, vs. sAML vs. tAML). It has therefore been supplanted by the WHO classification, which puts more emphasis on cytogenetics and natural history.


- AML with characteristic genetic abnormalities
  - t(8;21), inv(16) or t(16;16), t(15;17), t(9;11), t(6;9), inv(3) or t(3;3), t(1;22)
- AML with myelodysplasia related changes
- AML with prior MDS or MPD
- AML, therapy-related
- AML with prior chemotherapy and/or radiation
  - 5, -7, 11q23
- AML not otherwise categorized
  - AML not falling into the above categories
- Acute leukemias of ambiguous lineage
  - Mixed lineage or biphenotypic acute leukemia
5ii. Cytogenetics
Since 1998, AML has been divided into three cytogenetic risk groups that help define treatment (see 6 below):

<table>
<thead>
<tr>
<th>Risk Status</th>
<th>SWOG/ECOG (2000)</th>
<th>%</th>
<th>MRC AML 10 (1998)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Favourable</strong></td>
<td>inv(16)/t(16;16)/del(16q) t(15;17) +/- other aberrations: t(8;21) without del(9q) or complex karyotypes</td>
<td>20</td>
<td>inv(16)/t(16;16)/del(16q) t(15;17), t(8;21) +/- other aberrations</td>
<td>21</td>
</tr>
<tr>
<td><strong>Good</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intermediate</strong></td>
<td>Normal, +8, +6, -Y, del(12p)</td>
<td>46</td>
<td>Normal, 11q23 abn, +8, del(9q), del(7q), +21, +22, all others</td>
<td>62</td>
</tr>
<tr>
<td><strong>Indeterminate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Standard</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Unfavourable</strong></td>
<td>del(5q)/-5, -7/del(7q), abn 3q abn 9q, 11q, 20q, 21q, 17p, t(6;9), t(9;22), complex karyotypes (&gt;= 3 unrelated abn)</td>
<td>30</td>
<td>del(5q)/-5, -7, abn 3q abn 9q, 11q, 20q, 21q, 17p, complex karyotypes (&gt;= 5 unrelated abn), t(6;9), t(9;22)</td>
<td>17</td>
</tr>
<tr>
<td><strong>Poor</strong></td>
<td></td>
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</tbody>
</table>

The MRC AML classification was updated in 2010:

<table>
<thead>
<tr>
<th>Risk Status</th>
<th>Revised MRC (2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Favourable</strong></td>
<td>t(15;17)</td>
</tr>
<tr>
<td><strong>Good</strong></td>
<td>t(8;21)</td>
</tr>
<tr>
<td></td>
<td>inv(16)/t(16;16)</td>
</tr>
<tr>
<td><strong>Intermediate</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Indeterminate</strong></td>
<td>Normal, + entities not classified as favourable or adverse</td>
</tr>
<tr>
<td><strong>Standard</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Unfavourable</strong></td>
<td>inv(3)/t(3:3), other abn(3q) [excluding t(3:5)]; add(5q), del(5q), -5; -7, add(7q)/del(7q); t(6;11), t(10;11), other t(11q23) [excluding t(9;11)+t(11;19)]; t(9;22); -17/abn(17p); Complex (≥4 unrelated abnormalities)</td>
</tr>
<tr>
<td><strong>Poor</strong></td>
<td></td>
</tr>
</tbody>
</table>
The importance of the “Monosomal Karyotype*” as a negative prognostic factor was recognized in 2008:

*Monosomal karyotype (MK+): (an autosomal monosomy in conjunction with at least one other autosomal monosomy or structural abnormality; - trumps all other karyotypic considerations in non-good risk (i.e.non-CBF) AMLs [-X and -Y excluded]).

Current PMH cytogenetic classification:

<table>
<thead>
<tr>
<th>Risk Status</th>
<th>Current PMH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Favourable Good</td>
<td>t(15;17)</td>
</tr>
<tr>
<td></td>
<td>t(8;21)</td>
</tr>
<tr>
<td></td>
<td>inv(16)/t(16;16)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Normal, + entities not classified as favourable or adverse</td>
</tr>
<tr>
<td>Indeterminate</td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td></td>
</tr>
<tr>
<td>Unfavourable Poor</td>
<td>inv(3)/t(3;3), other abn(3q) [excluding t(3;5)]; add(5q), del(5q), -5;</td>
</tr>
<tr>
<td></td>
<td>-7, add(7q)/del(7q); t(6;11), t(10;11), other t(11q23)</td>
</tr>
<tr>
<td></td>
<td>[excluding t(9;11) + t(11;19)]; t(9;22);</td>
</tr>
<tr>
<td></td>
<td>-17/abn(17p); Complex (≥4 unrelated abnormalities)</td>
</tr>
<tr>
<td></td>
<td>MK+ cases not scored elsewhere</td>
</tr>
</tbody>
</table>

5iii. Molecular

Molecular testing at the time of diagnosis, in non-APL AML, is generally restricted to a limited number of scenarios:

i. NPM1 and Flt3-ITD and Flt3-TKD testing in cytogenetically normal AMLs.

ii. c-Kit mutation testing in high Lkc or otherwise problematic t(8;21), inv(16), or t(16;16) cases

iii. Documented or presumed cases of CML in blast crisis

iv. Flt3 testing for clinical trial eligibility
i. and ii. above feature prominently in decisions regarding allogeneic stem cell transplantation (alloSCT). Molecular testing, as appropriate, also plays an important role in ongoing, post-remission, minimal residual disease (MRD) assessment (see 6. and 8. below).

6. Management

6.1 Management Algorithms
Based on an assessment of prognostic factors, an individualized treatment plan is chosen.

^AML - Prognostic factors
  - Age
  - Secondary or treatment-related leukemia
  - Comorbidities
  - Cytogenetics
    - Favourable
    - Intermediate
    - Poor risk
  - Molecular Studies NPM1/Flt3/cKit
  - Other
    - elevated LDH
    - presentation LKC

#AML - Treatment Options
  1. Best supportive care
  2. Azacitidine
  3. Low dose cytarabine
  4. Experimental medication in clinical trial
  5. Induction chemotherapy with “curative” intent +/- alloSCT

Chemotherapy protocols for newly diagnosed patients above and below age 60 are listed in 6.2.1 below.

Allogeneic SCT indications are found in 6.4 below.

Chemotherapeutic approaches to relapsed/refractory disease are found in 6.2.1 below.
### 6.2 A) AML upfront treatment (September 2015)

- The following represent some of the acceptable care at the Princess Margaret.
- As part of standard of care, patients should be offered a clinical trial whenever possible.
- Treatment should be individualized based on performance status, comorbidities, patient preference.
- In age 60-70 and high risk disease (eg: poor risk cyto, prior MPN, prior MDS), induction chemotherapy may be delayed until transplant donor identified. If patient progresses, induction chemotherapy should be started. In patients where the likelihood of finding a donor is high, induction chemotherapy may be started prior to the identification of a donor.
- 5’azacytidine may be available on companionate basis for some indications.
- If cytogenetic and/or molecular results are not available, clinical judgment should guide treatment.

<table>
<thead>
<tr>
<th></th>
<th>&lt;60</th>
<th>&gt;60</th>
<th>70-80</th>
<th>&gt;80</th>
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</thead>
<tbody>
<tr>
<td><strong>Good risk cytogenetics</strong></td>
<td></td>
<td></td>
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<tr>
<td>Inv 16; t(8:21)</td>
<td>Good risk cyto 7+3</td>
<td>Good risk cyto 7+3</td>
<td>Good risk cyto 7+3</td>
<td>Good risk cyto 7+3</td>
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<tr>
<td></td>
<td>(age&lt;60)</td>
<td>(age&lt;60)</td>
<td>(age&lt;60)</td>
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<td></td>
<td>LDAC</td>
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<td></td>
<td>5’aaza</td>
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<td></td>
<td></td>
<td></td>
<td>Supportive care</td>
<td></td>
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<tr>
<td><strong>Int risk cyto/molecular</strong></td>
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<tr>
<td></td>
<td>7+3 (age&lt;60)</td>
<td>7+3 (age&lt;60)</td>
<td>7+3 (age&lt;60)</td>
<td>5’aaza</td>
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<td>LDAC</td>
<td>Supportive care</td>
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<td>5’aaza</td>
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<td>Supportive care</td>
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<td>7+3 (age&lt;60)</td>
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<tr>
<td><strong>Poor risk cytogenetics</strong></td>
<td></td>
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</tr>
<tr>
<td>(-7, -5, inv 3, 11q23, ≥3</td>
<td>Flag-ida</td>
<td>Flag-ida</td>
<td>Supportive care</td>
<td>Supportive care</td>
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<tr>
<td>abnormalities)</td>
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<td></td>
<td>5’aaza</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>5’aaza</td>
</tr>
<tr>
<td><strong>High risk molecular (flt3+ve)</strong></td>
<td></td>
<td></td>
<td>Supportive care</td>
<td>Supportive care</td>
</tr>
<tr>
<td></td>
<td>7+3 (age&lt;60)</td>
<td>7+3 (age&lt;60)</td>
<td>5’aaza</td>
<td>5’aaza</td>
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<tr>
<td><strong>Prior MPN</strong></td>
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<td></td>
<td>Flag-ida</td>
<td>Flag-ida</td>
<td>Supportive care</td>
<td>Supportive care</td>
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<td></td>
<td></td>
<td></td>
<td>5’aaza</td>
<td></td>
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<tr>
<td><strong>Prior MDS (with intermediate or good risk cyto)</strong></td>
<td>7+3 (age&lt;60)</td>
<td>7+3 (age&lt;60)</td>
<td>Supportive care</td>
<td>Supportive care</td>
</tr>
<tr>
<td>If poor risk cyto, then treat as above</td>
<td></td>
<td></td>
<td>5’aaza</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>7+3 (age&lt;60)</td>
</tr>
<tr>
<td><strong>Therapy-related AML with intermediate or good risk cyto</strong></td>
<td>7+3 (age&lt;60)</td>
<td>7+3 (age&lt;60)</td>
<td>Supportive care</td>
<td>Supportive care</td>
</tr>
<tr>
<td>If poor risk cyto, then treat as above</td>
<td></td>
<td></td>
<td>5’aaza</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7+3 (age&lt;60)</td>
</tr>
</tbody>
</table>
Newly diagnosed Patients – Consolidation

6.2 B) **AML up front induction chemotherapy (September 2015)**

**7+3 (age less than 60 years)**

**Induction:**  Daunorubicin 60 mg/m\(^2\) IV push daily x 3 (for EF≥50%)  
              Cytarabine: 200 mg/m\(^2\)/day continuous IV infusion x 7 days

**Consolidation (2 cycles):**  Daunorubicin 45 mg/m\(^2\) IV push daily x 2 (for EF ≥50% or <10% drop between cycles)  
                                Cytarabine 3 g/m\(^2\) per dose IV over 3 hours q12h on Days 1, 3, 5 (6 doses total)

**7+3 (age 60 years and over)**

**Induction:**  Daunorubicin 60 mg/m\(^2\) IV push daily x 3 (for EF≥50%)  
              Cytarabine: 100 mg/m\(^2\)/day continuous IV infusion x 7 days

**Consolidation (2 cycles):**  Daunorubicin 45 mg/m\(^2\) IV push daily x 2 (for EF ≥50% or <10% drop between cycles)  
                                Cytarabine 1.5 g/m\(^2\) per dose IV over 3 hours q12h on Days 1, 3, 5 (6 doses total)

**OR**

Consolidation for frailer individuals:

**Consolidation (cycle 1):**  Daunorubicin 60 mg/m\(^2\) IV push daily x 3 (for EF ≥50% or <10% drop between cycles)  
                               Cytarabine 100 mg/m\(^2\) continuous IV infusion x 7 days

**Consolidation (cycle 2):**  Mitoxantrone 10 mg/m\(^2\) IV daily x 5 (for EF ≥50% or <10% drop between cycles)  
                             Etoposide 100 mg/m\(^2\) IV daily x 5 days

**Good risk cytogenetics 7+3 (age less than 60 years) (Inv 16, t(8;21))**

**Induction:**  Daunorubicin 60 mg/m\(^2\) IV push daily x 3 (for EF≥50%)  
              Cytarabine 200 mg/m\(^2\)/day continuous IV infusion x 7 days

**Consolidation (cycle 1):**  Daunorubicin 45 mg/m\(^2\) IV push daily x 2 (for EF ≥50% or <10% drop between cycles)  
                              Cytarabine 3 g/m\(^2\) per dose IV over 3 hours q12h on Days 1, 3, 5 (6 doses total)

**Consolidation (cycle 2 and 3):**  Cytarabine 3 g/m\(^2\) per dose IV over 3 hours q12h on Days 1, 3, 5 (6 doses total)

**Good risk cytogenetics 7+3 (age 60 years and over) (Inv 16, t(8;21))**

**Induction:**  Daunorubicin 60 mg/m\(^2\)/day IV push daily x 3 (for EF≥50%)  
              Cytarabine: 100 mg/m\(^2\) continuous IV infusion x 7 days

**Consolidation (cycle 1):**  Daunorubicin 45 mg/m\(^2\) IV push daily x 2 (for EF ≥50% or <10% drop between cycles)  
                              Cytarabine 1.5 g/m\(^2\) per dose IV over 3 hours q12h on Days 1, 3, 5 (6 doses total)

**Consolidation (cycle 2 and 3):**  Cytarabine 1.5 g/m\(^2\) per dose IV over 3 hours q12h on Days 1, 3, 5 (6 doses total)
**FLAG-IDA:**

**Induction:**
GCSF 300 mcg SC daily x 6 days (Days 0 to 5)
Idarubicin 10 mg/m$^2$ IV push daily x 3 (Days 1 to 3)
Fludarabine 30 mg/m$^2$ IV daily over 30 min daily x 5 (Days 1 to 5)
Cytarabine 2000 mg/m$^2$ IV daily over 4 hours x 5 days (start 4 hours post fludarabine) (Days 1 to 5)

**Consolidation:**
GCSF 300 mcg SC daily x 4 days (Days 1 to 4)
Idarubicin 10 mg/m$^2$ IV push daily x 2 (Days 1, 2)
Fludarabine 30 mg/m$^2$ IV daily over 30 min daily x 4 (Days 1 to 4)
Cytarabine 2000 mg/m$^2$ IV daily over 4 hours x 4 days (start 4 hours post fludarabine) (Days 1 to 4)

**Low dose Ara-C:**

**Induction:**
20 mg/m$^2$ SC bid or continuous IV infusion x 10 days
(if frail, can consider 10 mg/m$^2$ SC bid or continuous infusion x 14 days)

**Consolidation (monthly up to 12 cycles)**
20 mg/m$^2$ SC bid x 7 days

**5’Azacitidine:**
5’Azacitidine 75 mg/m$^2$ SC daily x 6 days  q28 days

**If EF<50%**
If EF<50% at diagnosis, give FLAG induction (no idarubicin) and FLAG consolidation x 2
If EF<50% or >10% fall from previous post-induction, give HiDAC 3 g/m$^2$ (age <60) or 1.5 g/m$^2$ (age >60) q12h d1,3,5 x 3 cycles
AML Induction (all subgroups except M3) (excluding poor risk cyto, prior MDS, prior MPN) (June 2014)

**Chemotherapy**

**Hydration**
D5W with NaHCO₃ (tumor lysis syndrome prevention)

**Age < 60 years**

**LVEF > 50%**
- Daunorubicin (60 mg/m²) x 3 days
- Cytarabine (200 mg/m²/day) as continuous IV infusion x 7 days

**LVEF <50%**
- Fludarabine 30 mg/m² IV over 30 min daily x 5 days
- Cytarabine 2000 mg/m² IV over 4 hours x 5 days
- GCSF 300 mcg SC daily x 6 days

**Age ≥ 60 years**

**LVEF > 50%**
- Daunorubicin (60 mg/m²) x 3 days
- Cytarabine (100 mg/m²/day) as continuous IV infusion x 7 days
- GCSF 300 mcg SC daily x 6 days

**LVEF <50%**
- Fludarabine 30 mg/m² IV over 30 min daily x 5
- Cytarabine 2000 mg/m² IV over 4 hours x 5 days

**Other supportive medications**
- Allopurinol 300 mg PO daily for 7 days Days 1-7
- Ondansetron 8 mg PO/IV q12h for 3 days Days 1-3 (for 7+3) or for 5 days Days 1 to 5 (FLAG)
- Prochlorperazine 10 mg PO Q6H prn
- Pred Forte 1% eye drops QID Days 1-5 (for FLAG)
- Celebrex 100 mg BID Days 1-5 (for FLAG)
- Ciprofloxacin 500 mg BID starting day +8
- Amoxicillin 500 mg TID day +8
- Fluconazole 400 mg OD day +8
Notes:

1) Consolidation may be given as an inpatient or outpatient. For outpatient therapy patients will be seen daily in transfusion unit for evaluation and hydration. The 1, 3 and 5 dose of ara-C will be given in the transfusion unit, while the 2,4,6 dose will be given at home by AIP. For flexibility a one or two day gap is permissible between day 1 and 3 or day 3 and 5 ara-C. IV hydration is administered to patients receiving consolidation as an outpatient on Days 2 and 4.

2) Stem cell transplant criteria: Stem cell transplant is suggested for any of the following: adverse risk cytogenetics, secondary or therapy related AML, FLT3 ITD+ or MLL+.

3) LP criteria: Patients with initial WBC > 40 x 109/L, CD56+ AML and AML M5, should have a diagnostic LP performed on Day 7-8 of induction, after blasts have cleared from the blood, with cytarabine 70 mg given intrathecally (IT). If CNS is positive, LP + IT chemo. should be given twice weekly until clear.

4) Conventional induction therapy should be offered to AML patients > age 70 with intermediate or good risk cytogenetics who are otherwise medically fit. Induction therapy may need to be started urgently in some patients, prior to obtaining cytogenetic results.

5) Conventional induction therapy should not be routinely offered to AML patients > age 60 with adverse cytogenetics, including deletions of chromosome 5 or 7, inv(3), 11q23 abnormalities or complex cytogenetic abnormalities (3 or more) other than t(15;17), t(8;21) or inv(16). These patients should be offered azacytidine low-dose palliative or investigational therapy. However, induction therapy may be offered to patients in this group in the setting of investigative therapy designed to increase CR rate or CR duration (including nonmyeloablative BMT)

6) For patients with t(8;21) or inv(16): BMT not recommended unless evidence of progression with follow-up (see below), or if adverse prognostic factors present at diagnosis, such as t(8;21) with c-kit mutation. Patients who are unable to complete this consolidation schedule, e.g. due to CNS toxicity, should be considered for allogeneic BMT.

7) For patients with t(8;21) or inv(16): Molecular monitoring of bone marrow by pcr q 3 months x 2 years, then q6 months x 1 year. If molecular recurrence or increase in transcript level, repeat within 1 month. If confirmed, esp. to levels > 1 in 10, refer for BMT assessment and consider administering another consolidation.
6.4

**AML relapse treatment (September 2015)**

- The following represent some of the accepted care at the Princess Margaret.
- As part of standard of care, patients should be offered a clinical trial whenever possible.
- Treatment should be individualized based on performance status, comorbidities, patient preference.
- Reinduction chemotherapy may be delayed until transplant donor identified. If patient progresses, reinduction chemotherapy should be started. In patients where the likelihood of finding a donor is high, induction chemotherapy may be started prior to the identification of a donor.
- May consider 5’azacytidine for some patients.

<table>
<thead>
<tr>
<th>Condition</th>
<th>&lt;60</th>
<th>60-70</th>
<th>71-80</th>
<th>&gt;80</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary non-responder to 7+3</strong></td>
<td>Flag-ida</td>
<td>Flag-ida</td>
<td>Supportive care</td>
<td>Supportive care</td>
</tr>
<tr>
<td><strong>Primary non-responder to Flag-ida</strong></td>
<td>Mitoxantrone 10mg/m2 daily x 5 V16-100mg/m2 daily x 5 Ara-C1.5g/m2 CIV x 4d</td>
<td>Mitoxantrone 10mg/m2 daily x 5 V16-100mg/m2 daily x 5 Ara-C1.5g/m2 CIV x 4d</td>
<td>Supportive care</td>
<td>Supportive care</td>
</tr>
<tr>
<td><strong>Relapse &lt; 6 months post 7+3</strong></td>
<td>Flag-ida</td>
<td>Flag-ida</td>
<td>Supportive care</td>
<td>Supportive care</td>
</tr>
<tr>
<td><strong>Relapse &lt;6 months post Flag-ida</strong></td>
<td>Mitoxantrone 10mg/m2 daily x 5 V16-100mg/m2 daily x 5 Ara-C1.5g/m2 CIV x 4d</td>
<td>Mitoxantrone 10mg/m2 daily x 5 V16-100mg/m2 daily x 5 Ara-C1.5g/m2 CIV x 4d</td>
<td>Supportive care</td>
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</tr>
<tr>
<td><strong>Relapse 6-12 months post 7+3</strong></td>
<td>Flag-ida</td>
<td>Flag-ida</td>
<td>Supportive care</td>
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<tr>
<td><strong>Relapse 6-12 months post Flag-ida</strong></td>
<td>Mitoxantrone 10mg/m2 daily x 5 V16-100mg/m2 daily x 5 Ara-C1.5g/m2 CIV x 4d</td>
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<td>Supportive care</td>
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<tr>
<td><strong>Relapse &gt;12 months post 7+3</strong></td>
<td>Flag-ida 7+3</td>
<td>7+3 Flag-ida</td>
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<tr>
<td><strong>Relapse &gt;12 months post Flag-ida</strong></td>
<td>Mitoxantrone 10mg/m2 daily x 5 V16-100mg/m2 daily x 5 Ara-C1.5g/m2 CIV x 4d</td>
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<td>Flag-ida</td>
<td>Supportive care 5’aza</td>
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6.5 **Radiation Therapy**
Radiation therapy is not used routinely in AML treatment. Radiotherapy plays a role in the control of CNS leukemia, the control of resistant localized disease (eg. persistent paraspinal mass), and in pre-transplant conditioning.

6.6 **Other Therapy**
Autologous and allogeneic stem cell transplantation (SCT).

Auto SCT-
There is currently no indication for auto SCT in AML (except for APL in a molecularly-negative CR2).

AlloSCT-
- Allogeneic transplantation is a treatment option for patients with AML in CR1 with high-risk features including high-risk cytogenetic (see 5.ii above) or molecular phenotypes (see 5.iii above), high-risk clinical features at presentation (such as high Lkc), and secondary or treatment-related AML.

AlloSCT is also indicated in a subset of intermediate risk (standard risk) patients in CR1. Specifically, this group includes standard risk patients with an abnormal karyotype, as well as patients with a normal karyotype, but with a Flt3-ITD+ve or dual Flt-3-ITD-ve/NMP1-ve mutational status.

Allo SCT may also be considered in CR1 in cytogenetic good risk patients carrying a cKit mutation, and in patients shown to carry an MLL mutation.

- Beyond first complete remission, alloSCT is the ended option for eligible patients with AML who achieve a second or subsequent remission.

6.7 **Oncology Nursing**

Refer to [general oncology nursing practice](#)

7. **Supportive Care**

7.1 **Patient Education**
AML patients and their families receive extensive education (by physicians and specialty nurses) at the time of diagnosis. This education is then reviewed and reinforced during their inpatient and outpatient treatment. Additional teaching occurs prior to and at the time of initial discharge, and this teaching is reviewed during outpatient follow up.

An extensive patient education package which covers all aspects of their care, has been prepared for this patient group.

7.2 **Psychosocial Care**

Refer to [general psychosocial oncology care guidelines](#)
7.3 Symptom Management

Refer to general symptom management care guidelines

7.4 Clinical Nutrition

Refer to general clinical nutrition care guidelines

7.5 Palliative Care

Refer to general oncology palliative care guidelines

8. Follow-up Care

AML patients that proceed to alloSCT are followed by the alloSCT service.

AML patients that do not proceed to alloSCT are supervised closely by the leukemia service during the completion of their induction and consolidation chemotherapy, and are then followed on an ongoing basis. Specifically, patients with specific molecular abnormality that can be detected by PCR, are seen every three months for two years, then every 6 months for 1-2 years, and yearly thereafter. In addition to careful review of bloodwork and clinical status, molecular analyses are performed routinely for the first 3-4 years.

Patients lacking such abnormalities are followed on a similar schedule, with careful review of bloodwork and clinical status.