

## Prototype/Template for Pediatric Hospital Orders During a Radiation Incident

Version: June 26, 2018

### Cautions

- Authored by [REMM](#) and [RITN](#) physicians, this set of orders is a prototype only.
  - **Orders must be customized for each patient and incident.**
  - Specific drugs are suggested for function only. Patients may not need any/every category of drug listed.
  - No HHS, CDC, FDA, or other US government entity endorsement of specific drugs or drug doses is intended or implied by inclusion in this order set.
  - Consult the notes at the end of this document for additional, key information.
- 

### Internal contamination (decorporation treatments)

- This **Pediatric Orders Prototype** lists only FDA-approved medications as radioisotope countermeasures.
  - Some, but not all of these drugs are currently in the [Strategic National Stockpile](#).
  - Prescribers should consult the FDA drug label for complete prescribing information.
  - Decorporation drugs should be used in children with great caution.
  - The online version of REMM has additional recommendations about [additional countermeasure drugs that may be considered](#).
  - This prototype does **not** address threshold levels of [internal contamination](#) that would trigger initiation, continuation, or discontinuation of decorporation treatment. See [REMM Countermeasures Caution and Comment](#), which discusses this issue.
- 

### Drug dosages

- All drug doses in this prototype should be customized for each patient.
  - All pediatric drug doses should be prescribed as appropriate for **age, weight**, and any **clinical issues**, including allergies.
  - Appropriate dose adjustments should be made based on age, weight, drug-drug interactions, nutritional status, renal, hepatic function, and risk/benefit calculus.
- 

- After a mass casualty incident, practitioners may encounter counterfeit drugs. This [FDA website](#) will provide information on avoiding and detecting counterfeit drugs and assist with reporting of suspected counterfeit medications.
- If this pediatric order set, **Version date 6/26/2018**, has been printed for use offline, consult the online version of REMM to see if updates are available. <https://www.remm.nlm.gov/pediatric-order.pdf>

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**1. Administrative information**

Name: \_\_\_\_\_

Unique Identifier: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Spoken language: \_\_\_\_\_

Date of Birth: \_\_\_\_\_

Age Months (if <3 years) \_\_\_\_\_ Years \_\_\_\_\_

Height (cm)/ \_\_\_\_\_ Weight (Kg) \_\_\_\_\_

Gender: \_\_\_\_\_

Dietary Special needs: \_\_\_\_\_

Default Guarantor: \_\_\_\_\_

Relationship: \_\_\_Father \_\_\_Mother \_\_\_Other: specify \_\_\_\_\_

Next of kin and contact information (home phone, cell phone, email, or address):  
\_\_\_\_\_

Primary Care Provider: \_\_\_\_\_

**2. Admit to:**

\_\_\_ Inpatient Service \_\_\_\_\_ Area \_\_\_\_\_

\_\_\_ Team: \_\_\_\_\_ PICU \_\_\_\_\_

\_\_\_ Hem/Onc: \_\_\_\_\_ Hematopoietic Stem Cell Transplantation: \_\_\_\_\_

\_\_\_ Admitting Physician: \_\_\_\_\_ Pager: \_\_\_\_\_

\_\_\_ Attending Physician: \_\_\_\_\_ Pager: \_\_\_\_\_

\_\_\_ Other Physician: \_\_\_\_\_ Pager: \_\_\_\_\_

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**3. Diagnoses**

**Acute/Chronic Non-radiation Related Admission Diagnoses:**

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_
- f. \_\_\_\_\_

**Acute Radiation-related Admission Diagnoses**

- a. **Radiation contamination?** Yes\_\_\_\_\_ No\_\_\_\_\_

See REMM [Body Chart](#) (page 20) to record whole body radiation survey.

- External contamination with Isotope (Specify or unknown) \_\_\_\_\_
- Internal contamination with Isotope (Specify or unknown) \_\_\_\_\_
- Contamination suspected, Isotope uncertain

- b. **Radiation Exposure / Acute Radiation Syndrome (ARS)?**

Yes\_\_\_\_\_ No\_\_\_\_\_

- Estimated whole body dose from exposure \_\_\_\_\_(units of gray/Gy)
- See also **Item #24** for additional radiation details and work-up

**Other potential complicating factors**

- Mass casualty incident
- Other, Specify \_\_\_\_\_

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**Specific populations potentially requiring more customized management?**

Yes\_\_\_\_\_ No\_\_\_\_\_

\_\_\_ Infant (< 1 y)

\_\_\_ Child (1-18 y)

\_\_\_ Pregnant/Possibly pregnant Duration of Pregnancy (weeks): \_\_\_\_\_

\_\_\_ Immunosuppressed: \_\_\_\_\_

\_\_\_ Other, Specify \_\_\_\_\_

- See REMM page about [At-Risk/Special Needs Populations](#)

**4. Precautions:**

**Infectious**

- \_\_\_ Contact
- \_\_\_ Droplet
- \_\_\_ Airborne
- \_\_\_ Reverse Isolation/Neutropenic

**Radiation precautions**

- For persons with known or suspected [external or internal contamination](#).
- Persons with [exposure](#) but NO [contamination](#) are NOT radioactive. Patients with exposure only do not need Radiation Precautions.

- \_\_\_ **Precautions:** Single room, gown, mask, cap, boots, and gloves
- \_\_\_ Use medical facility procedures for discarding all biological/physical/radioactive waste, including linens/towels/trash/personal protective equipment.
- \_\_\_ Contact Radiation Safety Officer for additional instructions.  
Phone: \_\_\_\_\_ Pager: \_\_\_\_\_
- \_\_\_ Place Radiation Safety Sign on door if patient has internal or external radioactive contamination
- \_\_\_ Notify pregnant staff that entry to room is prohibited if patient is/may be contaminated.
- \_\_\_ Everyone entering room/area of contaminated patient must wear personal radiation dosimeter assigned by Radiation Safety.
- \_\_\_ Use medical facility procedures for disposal of **radiation** waste, including linens/towels/trash/personal protective equipment.

- **See guidance**

- [2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings](#) Healthcare Infection Control Practices Advisory Committee (HHS/CDC)

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**5. Urgent consultations: specify**

- |   |   |
|---|---|
| <input type="checkbox"/> Pediatric Hematology/Oncology  | <input type="checkbox"/> Intensive Care                   |
| <input type="checkbox"/> Hematopoietic Stem Cell Transplantation  | <input type="checkbox"/> Transfusion Medicine             |
| <input type="checkbox"/> Mental Health / Psychiatry   | <input type="checkbox"/> Radiation Oncology               |
| <input type="checkbox"/> Ophthalmology  | <input type="checkbox"/> Endocrinology                    |
| <input type="checkbox"/> Dermatology / Plastic Surgery  | <input type="checkbox"/> Palliative Care and Pain Service |
| <input type="checkbox"/> Radiation Safety   | <input type="checkbox"/> Gastroenterology                 |
| <input type="checkbox"/> Surgery: <input type="checkbox"/> General <input type="checkbox"/> Trauma <input type="checkbox"/> Thoracic <input type="checkbox"/> Orthopedics | <input type="checkbox"/> Burn Therapy                     |
| <input type="checkbox"/> Hepatology   | <input type="checkbox"/> Infectious Disease               |
| <input type="checkbox"/> Pulmonary  | <input type="checkbox"/> Plastic Surgery                  |
| <input type="checkbox"/> Cardiology   | <input type="checkbox"/> Nephrology                       |
| <input type="checkbox"/> ENT  |   |
| <input type="checkbox"/> Other _____  |   |

**6. Condition:**

- Good     Fair     Stable     Guarded     Critical

**7. Vital Signs:**

- q 2 hours X 4                       Ward routine  
 q 4 hours X 4

**Notify physician for:**

O<sup>2</sup> sat: \_\_\_\_\_ < 92%

**Pediatric SIRS Criteria (Systemic Inflammatory Response Syndrome)**

Modified SIRS Criteria: must have 2 of 4 criteria, 1 must be temperature or leukocyte abnormality

- Temperature (core) <36 °C or >38.5 °C
- Tachycardia: HR > 2 SD above normal for age or bradycardia if < 1 year old
- Respiratory: Mean RR >2 SD above normal for age or mechanical ventilation required for an acute process
- Elevated or depressed WBC for age (unrelated to chemotherapy induced leukopenia) or >10% immature neutrophils

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**Initiate sepsis workup for the following conditions:**

Age	HR (95 <sup>th</sup> %ile)	HR (75 <sup>th</sup> %ile)	Systolic BP (5 <sup>th</sup> %ile)
0 d - ≤ 1 m	>205	>155	<60
> 1 m – ≤ 3 m	>205	>155	<70
> 3 m – ≤ 1 y	>190	>140	<70
> 1 y – ≤ 2 y	>190	>130	<70 + (age in yr x 2)
> 2 y – ≤ 10 y	>140	>110	<70 + (age in yr x 2)
>10 y	>100	>100	<90

**8. Allergies:**

- No Known Drug Allergies (NKDA)
- Allergies (drugs, foods)
- If yes, specify drug/food and reaction: \_\_\_\_\_

**9. Activity:**

- Bed rest     Bathroom privileges
- Out of bed/up to chair every \_\_\_\_ hrs.
- Ambulate as tolerated     Confine to room

**10. Diet:**

- Regular Diet     Liquids (full, clear)     NPO
- Advance as tolerated
- Neutropenic diet
- Special dietary needs/requests: \_\_\_\_\_

**11. Height, weight:**

- Height: \_\_\_\_\_ cm
- Weight: \_\_\_\_\_ kg
- Repeat body weight: q \_\_\_\_\_ hours    q \_\_\_\_\_ days

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**12. Admission studies: Labs**

- CBC w/differential       w/ Platelet count
- Comprehensive Metabolic Panel (CMP) / Chem 14
- PT or INR/PTT/fibrinogen/TT
- Urinalysis - Collection method: \_\_\_\_\_
- Urine culture
- Blood culture - Collection method: \_\_\_\_\_ Sets: \_\_\_\_\_  
Type of culture: Bacteria, fungal, aerobic, anaerobic
- Sputum culture
- Urine HCG (for all girls  $\geq 10$  years or post-menarche, whichever is earlier)
- Serum HCG (for any girls  $\geq 10$  years or post-menarche, whichever is earlier)
- Thyroid Function Tests (Specify) \_\_\_\_\_
- Wound cultures

**Serologies:**

- Herpes Simplex Virus type 1 (HSV-1)
- Herpes Simplex Virus type 2 (HSV-2)
- Cytomegalovirus (CMV)
- Varicella-zoster Virus (VZV)
- Epstein Barr Virus (EBV)

**13. Blood bank**

(May set institutional transfusion parameters, e.g.: PRBC transfusion for Hgb < 7 g/dl and PLT < 20000/micL unless otherwise specified by medical staff.)

- Type and cross match
- Type and screen

For \_\_\_\_\_ units or \_\_\_\_\_ ml of packed red blood cells (~10-15 ml/kg)  
For \_\_\_\_\_ units or \_\_\_\_\_ ml of platelets (~5-10 ml/kg)

**Note:**

- Use only leukoreduced AND irradiated products, if available, unless it is known with certainty that the patient was exposed to allow dose of radiation, e.g. less than 100 cGy.
- If radiation whole body dose is not known with certainty, leukoreduced AND irradiated products are preferred, if available.
- See [REMM blood use page](#) for additional information.



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**14. Imaging**

Chest x-ray Urgency: \_\_\_\_\_

PA/Lateral Urgency: \_\_\_\_\_

Portable Urgency: \_\_\_\_\_

Other imaging studies Specify: \_\_\_\_\_

**15. Electrocardiogram**

Electrocardiogram

STAT Electrocardiogram for chest pain, notify physician

**16. Standing labs / studies**

CBC w/diff and platelets q \_\_\_\_\_ hours, x \_\_\_\_\_ days,  
Followed by q \_\_\_\_\_ until further orders

Comprehensive Metabolic Panel (CMP) / Chem 14  
Followed by q \_\_\_\_\_ hours, x \_\_\_\_\_ days  
Followed by q \_\_\_\_\_ until further orders

Other \_\_\_\_\_ (specify test and frequency)

**17. IV fluid management:**

IV Fluids: \_\_\_\_\_ @ \_\_\_\_\_ mL/hr, with additive \_\_\_\_\_

IV Fluids: \_\_\_\_\_ @ \_\_\_\_\_ mL/hr, with additive \_\_\_\_\_

**18.  Foley catheter management (specify) \_\_\_\_\_**

Use radiation precautions for urine and feces for patients with internal radiation contamination.

**19.  Monitor I / O**

Frequency \_\_\_\_\_

Use radiation precautions for urine and feces for patients with internal radiation contamination.

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**20. Deep Venous Thrombosis (DVT) prophylaxis:**

- TED hose to Bilateral Lower-Extremities
- Sequential Compression Devices (SCD)
- Anticoagulation regimen \_\_\_\_\_
- Other

**Note:** The potential benefit of any anticoagulation regimen (e.g. **heparin**) should be balanced against the risk of excessive bleeding in patients with severe thrombocytopenia or significant gastrointestinal toxicity.

**21. Respiratory Therapy:**

- Use radiation precautions for personnel, equipment, and waste if patient has internal radiation contamination.
- Room air      Chest tube care (Specify) \_\_\_\_\_
- Titrate oxygen supplementation for Oxygen saturation > \_\_\_\_%
- Bi-PAP
- Nebulizer treatment (Specify) \_\_\_\_\_

**22. Wound care: (see also item 25)**

- Decontaminate external wounds if there is external radiation contamination. See REMM radiation [contaminated wound](#) care recommendations.
- Sterile dressing to wounds daily/BID
- Monitor waste
  - Use medical facility procedures for discarding biological/**radioactive**/physical waste and linens/towels/trash/personal protective equipment.
- Radiation precautions** (needed if patient has radiation contamination)
- Silvadene (Silver Sulfadiazine)** cream topically to burns/BID
- Bacitracin** topically to burns/BID
- Plastic Surgery Consultation
- Other wound management per Burn team/Dermatology/Surgery:  
Pager \_\_\_\_\_ Phone \_\_\_\_\_

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**23. Orthopedic care:**

\_\_\_ Splint/brace/cast/crutches

\_\_\_ Other orthopedic management procedure per orthopedics:  
Pager \_\_\_\_\_ Phone \_\_\_\_\_

**24. Radiation Dose Assessment**

**A. Biodosimetry and Bioassay assays (reference material)**

- [Difference between Biodosimetry and Bioassay](#)
- [Define biodosimetry](#)
- [More about biodosimetry](#)
- [Dicentric chromosome assay](#)

**B. Biodosimetry assays for [radiation exposure](#)**

- See REMM information on
  - [Dose Estimator for Exposure: 3 biodosimetry tools](#)
  - [Dose Reconstruction](#)
- **Estimated whole body dose from exposure:** \_\_\_\_\_ (Gray)
  - Using which tool(s) \_\_\_\_\_  
e.g., vomiting, lymphocyte depletion kinetics, dicentric chromosome assay  
Note: if different assays give different results
- METREPOL Scores: Heme\_\_\_ GI\_\_\_ Neuro\_\_\_ Cutaneous\_\_\_
- Response Category (RC score) \_\_\_\_\_  
[Explain METREPOL](#)  
[Consider Response Category in clinical triage](#) (Interactive tool for ARS)
- Date of exposure: \_\_\_\_\_
- Time of exposure: \_\_\_\_\_
- Location of patient at time of exposure: \_\_\_\_\_
- Estimated whole body/partial body dose, specify \_\_\_\_\_ (dose)
- Dose unknown: \_\_\_\_\_

**Dicentric Chromosome Assay Instructions:**

- Draw extra green top tube and provide: date \_\_\_\_\_ time \_\_\_\_\_
- See REMM for location of approved US [laboratories that perform this test](#).
- Send this tube **ON ICE** for outside lab study
  - To the attention of: \_\_\_\_\_
  - Name of lab: \_\_\_\_\_
  - Address of lab: \_\_\_\_\_

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### C. [Radiation bioassay for evaluating/managing internal decontamination](#)

- Collect  $\geq 70$  mL Spot urine for \_\_\_\_\_(name of radioactive isotope)
  - Directions for sample collection, labeling, packaging and shipping bioassay specimen to CDC bioassay lab:  
<https://emergency.cdc.gov/radiation/labinfo.asp>

Note: Consult senior radiation event medical managers for name and location of other laboratories that may be available to perform this test in a mass casualty incident. Routine labs generally cannot perform this test, although in large incidents, senior managers may announce special arrangements.

### 25. General Medications:

- Clinical Pharmacist or PharmD managed medication dosing is essential
- Suggested dose ranges for **pediatric patients (PEDS)** are suggested but not mandated.
- Drug names are generally listed as follows **Generic (Brand)** names
- Some drugs with **bold blue font** have [DailyMed](#) hyperlinks with additional information.

#### For gastric acid suppression:

\_\_\_ **Lansoprazole (Prevacid)**  
PEDS: 1 to 2 mg/kg, max 30 mg/dose  
Dose: \_\_\_\_\_

#### For radiation-induced nausea & vomiting:

\_\_\_ **Ondansetron (Zofran)**  
PEDS: 0.15 mg/kg, max 8 mg/dose, IV/PO Q 8hrs PRN.  
Dose: \_\_\_\_\_

\_\_\_ **Lorazepam (Ativan)** for anxiety/insomnia/breakthrough nausea  
PEDS: 0.025 -0.05 mg/kg, max 2 mg/dose IV/PO q 6 hrs PRN.  
Dose: \_\_\_\_\_

\_\_\_ **Prochlorperazine** for anxiety/insomnia/breakthrough nausea  
PEDS: Children  $\geq 2$  years and weight  $\geq 9$  kg and Adolescents  
(NOTE: Administer with Diphenhydramine to mitigate risk of dystonia.)

#### Oral Prochlorperazine:

9-13 kg: 2.5 mg every 12-24 hours as needed; max daily dose: 7.5 mg/day

>13-18 kg: 2.5 mg every 8-12 hours as needed; max daily dose: 10 mg/day

>18-39 kg: 2.5 mg every 8 hours **or** 5 mg every 12 hours as needed;  
max daily dose: 15 mg/day

>39 kg: 5-10 mg every 6-8 hours; usual max daily dose: 40 mg/day

See [REMM bibliography on treatment of nausea and vomiting](#)

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**For fever:**

- \_\_\_ **Acetaminophen** q 6 – 8h PRN temperature > 38 °C  
PEDS: 15 mg/kg, max 650 mg PO Q 6 hrs PRN. Max 75mg/kg/day (**Tylenol**)  
Dose: \_\_\_\_\_

**For diarrhea:**

- \_\_\_ **Loperamide hydrochloride (Imodium):**
- **PEDS: Oral: Children ≥2 years and Adolescents**
    - 13 to <21 kg (2-5 years): Initial: 1 mg with first loose stool followed by 1 mg/dose after each subsequent loose stool; maximum daily dose: 3 mg/**day**
    - 21-27 kg (6-8 years): Initial: 2 mg with first loose stool followed by 1 mg/dose after each subsequent loose stool; maximum daily dose: 4 mg/**day**
    - 27.1-43 kg (9-11 years): Initial: 2 mg with first loose stool followed by 1 mg/dose after each subsequent loose stool; maximum daily dose: 6 mg/**day**
    - ≥43.1 kg (≥12 years): Initial: 4 mg with first loose stool followed by 2 mg/dose after each subsequent loose stool; maximum daily dose: 8 mg/**day**

**For rash (itching dosing):**

- \_\_\_ Topical sterile dressing
- \_\_\_ **Diphenhydramine hydrochloride (Benadryl)**  
PEDS: 0.5 mg/kg - 1 mg/kg, max 50 mg IV/PO Q 6 hrs PRN.  
Dose \_\_\_\_\_

**For pain:**

- \_\_\_ **Morphine Sulfate**  
PEDS: 0.05 mg/kg, max 2 mg/dose **IV** Q 2-4 hrs PRN  
0.2-0.5 mg/kg, max 15 mg/dose **PO** Q 4 hrs PRN
- \*\*PCA starting dose recommendation 0.015-0.02 mg/kg/dose,  
lockout 8-10 minutes, or continuous 0-0.02 mg/kg/hr and  
hourly max 0.1-0.12 mg/kg/hr.
- Dose \_\_\_\_\_

- \_\_\_ **Other pain medication** (specify): name, dose, route, frequency
- \_\_\_\_\_

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**For skin burns: (see also item 22: wound care)**

Burn topical regimen \_\_\_\_\_

Replace body fluid \_\_\_\_\_

Other burn therapy \_\_\_\_\_

**For oral mucositis:**

Mouth care regimen \_\_\_\_\_

**26. Radioisotope decorporation or blocking agents:**

- **Note: Only FDA approved radiation countermeasures are listed in table below.**
- **See [REMM table](#) longer list of countermeasures which have been recommended by some experts but are not FDA approved as radiation countermeasures.**
- **Pediatric administration of these should be discussed with toxicology experts in order to optimize risk/benefit.**
- **Adult and pediatric doses are noted below.**

Medical Countermeasure	Administered for	Route of Administration	Dosage	Duration
<b>Ca-DTPA<sup>1,3</sup></b> <b>Zn-DTPA<sup>1,3</sup></b>  <a href="#">See REMM's DTPA information.</a>  <a href="#">See FDA's Zn-DTPA drug label.</a>  <a href="#">See FDA's Ca-DTPA drug label.</a>	Americium (Am-241) <sup>1</sup>  Californium (Cf—252) <sup>2</sup>  Cobalt (Co-60) <sup>2</sup>  Curium (Cm-244) <sup>1</sup>  Plutonium (Pu-238 and Pu-239) <sup>1</sup>  Yttrium (Y-90) <sup>2</sup>	<b>IV<sup>1</sup>:</b> Give once daily as a bolus or as a single infusion, i.e., do not fractionate the dose.  DTPA is FDA-approved for intravenous Rx of known or suspected internal contamination with Am, Cm, and Pu only.  <b>Nebulized inhalation<sup>1</sup>:</b> DTPA is FDA-approved for nebulized inhalation in adults only, and if the route of contamination is through inhalation.	<b>IV:</b> 1 g in 5 cc 5% dextrose in <b>PEDS:</b> < 12 years old: 14 mg/kg IV qd, no more than 1g/day  <b>Nebulized inhalation:</b> 1 g in 1:1 dilution with sterile water or NS over 15-20 min  <b>PEDS: nebulized dosing same as adults</b>	<ul style="list-style-type: none"> <li>• Ca-DTPA for the first dose</li> <li>• Give Zn-DTPA for any follow-up doses (i.e., maintenance as indicated)</li> <li>• Duration of therapy depends on total body burden and response to treatment</li> </ul>

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Medical Countermeasure	Administered for	Route of Administration	Dosage	Duration
<p><b>Potassium iodide<sup>1</sup></b></p> <p><a href="#">See REMM's KI summary information.</a></p> <p><a href="#">See FDA's KI information.</a></p>	<p>Iodine (I-131)</p> <p>[For projected thyroid gland exposure <math>\geq</math> 5cGy]</p>	<p>PO</p>	<p>(Adolescents <math>\geq</math> 150 lbs. should receive the full adult daily dose (130 mg/d)</p> <p><b>Adolescents, 12 through 18 years:</b> 65 mg/d</p> <p><b>Over 3 years through 12 years:</b> 65 mg/d</p> <p><b>1 month through 3 years:</b> 32 mg/d [Use KI oral solution with 65 mg/mL.]</p> <p><b>Birth through 1 month:</b> 16 mg/d [Use KI oral solution with 65 mg/mL.]</p>	<ul style="list-style-type: none"> <li>• <a href="#">See FDA pediatric dosing recommendations, including liquid vs. tablet options</a></li> <li>• Some incidents will require only a single dose of KI.</li> <li>• Incident managers may recommend additional doses if ongoing radioactive iodine ingestion or inhalation represents a continuing threat.</li> <li>• See also: <a href="#">Potassium Iodide (KI): Duration of Therapy.</a></li> <li>• <a href="#">See FDA information on duration of therapy.</a></li> </ul>

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Medical Countermeasure	Administered for	Route of Administration	Dosage	Duration
<p><b>Prussian blue, insoluble<sup>1</sup></b></p> <p><a href="#">See REMM's Prussian Blue summary information.</a></p> <p><a href="#">See FDA Prussian Blue information page.</a></p> <p><a href="#">See FDA's Prussian Blue drug label.</a></p>	<p>Cesium (Cs-137)</p> <p>Thallium (TI-201)</p>	<p><b>PO</b></p>	<p><b>PEDS:</b>  <b>&gt; 12 yrs:</b>            3 g po TID</p> <p><b>2-12 yrs:</b>            1 gm TID</p>	<ul style="list-style-type: none"> <li>• Minimum 30 days course per FDA</li> <li>• Obtain <a href="#">bioassay</a> and whole body counting to assess treatment of efficacy</li> <li>• Duration of therapy depends on total body burden and response to treatment</li> </ul>



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**27. Neutropenia therapy ± antimicrobials**

**Neutropenia therapy, if indicated:**

**Neutropenia definition:**

Total count of neutrophils + bands in the peripheral blood <1,000 /microL

- The 2 drugs listed below have been approved by the FDA for the indication of acute exposure to myelosuppressive doses of radiation
- See [REMM cytokines page](#) for more detailed information, especially potential need for [dose alterations during large mass casualty incidents when medical countermeasures may be scarce](#).

**Myeloid cytokines approved by the FDA for the indication of acute exposure to myelosuppressive doses of radiation (may consider biosimilar if available)**

Cytokine	Dose
<p style="text-align: center;">G-CSF or filgrastim (<a href="#">Neupogen</a>® drug label)</p>	<ul style="list-style-type: none"> <li>• 10 mcg/kg/day as a single daily subcutaneous injection in <b>adults and children (IV optional based on availability)</b></li> <li>• Continue administration daily until absolute neutrophil count remains greater than 1,000/mm<sup>3</sup> (= 1.0 x 10<sup>9</sup> cells/L) for 3 consecutive (daily) CBCs or exceeds 10,000/mm<sup>3</sup> (= 10 x 10<sup>9</sup> cells/L) after a radiation-induced nadir.</li> <li>• See <a href="#">REMM cytokines page</a> for more information about potential dose alterations during large mass casualty incidents when medical countermeasures may be scarce.</li> </ul>
<p style="text-align: center;">Pegylated G-CSF or pegfilgrastim (<a href="#">Neulasta</a>® drug label)</p>	<ul style="list-style-type: none"> <li>• <b>Pediatric patients weighing less than 45 kg:</b> refer to <a href="#">table in Neulasta drug label</a><sup>4</sup> (on page 20 of this document) for dose calculated by weight. Administer two doses of drug subcutaneously one week apart, if second dose is needed</li> <li>• A CBC should be obtained prior to administration of the second dose of Neulasta®. Subject matter experts recommend not administering the second dose if absolute neutrophil count is greater than 5,000/mm<sup>3</sup> (= 5.0 x 10<sup>9</sup> cells/L).</li> <li>• See <a href="#">REMM cytokines page</a> for more information about potential dose alterations during large mass casualty incidents when medical countermeasures may be scarce.</li> </ul>
<p style="text-align: center;">GM-CSF or sargramostim (<a href="#">Leukine</a>® drug label)</p>	<ul style="list-style-type: none"> <li>• A subcutaneous injection administered once daily as follows:</li> <li>• 7 mcg/kg in adult and pediatric patients weighing greater than 40 kg</li> <li>• 10 mcg/kg in pediatric patients weighing 15 kg to 40 kg</li> <li>• 12 mcg/kg in pediatric patients weighing less than 15 kg</li> <li>• Continue administration of Leukine until absolute neutrophil count remains greater than 1,000/mm<sup>3</sup> (= 1.0 x 10<sup>9</sup> cells/L) for 3 consecutive CBCs or exceeds 10,000/mm<sup>3</sup> (= 10 x 10<sup>9</sup> cells/L) after a radiation-induced nadir.</li> <li>• See drug label for prescribing information, especially <a href="#">warning related to diluent</a> use in infants and premature infants.</li> </ul>

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	<ul style="list-style-type: none"><li>• See <a href="#">REMM cytokines page</a> for more information about potential dose alterations during large mass casualty incidents when medical countermeasures may be scarce.</li></ul>
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### See Clinical Practice Guidelines for Myeloid Cytokines (for Adults)

- Smith TJ, Bohlke K, Lyman GH, Carson KR, Crawford J, Cross SJ, Goldberg JM, Khatcheressian JL, Leighl NB, Perkins CL, Somlo G, Wade JL, Wozniak AJ, Armitage JO. [Recommendations for the Use of WBC Growth Factors: American Society of Clinical Oncology Clinical Practice Guideline Update](#). (2015 ASCO guideline) J Clin Oncol. 2015 Oct 1; 33(28):3199-212. [PubMed Citation] (This 2015 ASCO guideline updates the [2006 myeloid cytokine guideline](#))
- [NCCN Clinical Practice Guidelines in Oncology, Myeloid Growth Factors, Version 1.2015](#). See section entitled "NCCN Guidelines for Supportive Care" > "Myeloid Growth Factors". (Registration required.)
- Dainiak N, Gent RN, et al. [First Global Consensus for Evidence-Based Management of the Hematopoietic Syndrome Resulting From Exposure to Ionizing Radiation](#). Disaster Med Public Health Prep. 2011 Oct;5(3):202-212. [PubMed Citation] ([Full text](#))

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### For Antimicrobial therapy **with** neutropenia:

#### Neutropenia definition:

Total count of neutrophils + bands in the peripheral blood <1,000 /microL

- For patients with neutropenia who have NOT HAD NEUTROPENIC FEVER.
- Use as appropriate for each patient.
- Drugs listed are examples only.

#### Anti-bacterial prophylaxis:

\_\_\_ [Levofloxacin \(Levaquin\)](#) (neutropenia without fever)

##### 6 months to 4 years old:

Oral, IV: 8 to 10 mg/kg/dose twice daily;

Maximum dose: 250 mg

Dose: \_\_\_\_\_

##### ≥5 years:

Oral, IV: 10 mg/kg/dose once daily; maximum dose: 500 mg/day

(Increase max to 750 mg/day if treating pneumonia)

Dose: \_\_\_\_\_

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**Anti-viral prophylaxis (neutropenia without fever)**

\_\_\_ **Acyclovir (Zovirax)**

Dosing varies based on VZV and HSV

Weight  $\leq$  40 kg: 60-90mg/kg/day divided in 2-3 divided doses  
(Max 800mg PO BID) Weight > 40kg: 800mg PO BID

Dose: \_\_\_\_\_

**Anti-fungal prophylaxis (neutropenia without fever)**

\_\_\_ **Fluconazole (Diflucan)** dose considered beginning when  
absolute neutrophil count (ANC) becomes < 1000

6 mg/kg PO/IV daily, max 400 mg daily

Dose: \_\_\_\_\_

or

\_\_\_ **Posaconazole (Noxafil)** with food – beginning when absolute neutrophil count  
(ANC) becomes < 1000

\_\_\_  $\geq$ 13 years –

**Suspension** is 4 mg/kg 3 times a day with fatty food.

**Tablets** (delayed release) **or IV** – d1 300 mg twice a day, then 300 mg daily

Dose: \_\_\_\_\_

**For treatment of neutropenia AND fever** (defined as T>38 °C while neutropenic)

**Anti-microbial work-up and therapy**

\_\_\_ Blood cultures

\_\_\_ Urinalysis w/culture

\_\_\_ Sputum culture + sensitivity

\_\_\_ Chest x-ray

\_\_\_ **Cefepime (Maxipime)**

PEDS: 50 mg/kg, max 2000 mg IV Q8h

Dose: \_\_\_\_\_

\_\_\_ **Vancomycin (Vancocin)**

Consider if: suspected catheter-related infection, skin or soft tissue infection,  
pneumonia or hemodynamic instability.

Consider trough level before 4th dose

PEDS: 15 mg/kg IV Q6-8h

Dose: \_\_\_\_\_

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**Antifungal therapy**

Consider one of the following if: fever >72 hours on antibacterial therapy, evidence of fungal infection or hemodynamic instability.

\_\_\_ **Voriconazole (Vfend)**

PEDS: 2 to 11 years: 9 mg/kg Q12H for two doses then 8 mg/kg IV Q12h  
≥12 yr or ≥ 50 kg: 6 mg/kg IV q12h for two doses, then 4 mg/kg IV q12h  
Dose: \_\_\_\_\_

\_\_\_ **Caspofungin (Cancidas)**

PEDS: 70 mg/m<sup>2</sup> IV once, then 50 mg/m<sup>2</sup> IV daily  
(max dose 70 mg once then 50 mg daily)  
Dose: \_\_\_\_\_

\_\_\_ **Liposomal amphotericin B (AmBisome)**

PEDS dose: 3-5 mg/kg/day IV over 2h  
Dose: \_\_\_\_\_

\_\_\_ **Amphotericin B lipid complex (Abelcet)**

PEDS dose: 5 mg/kg/day IV over 2h (2.5 mg/kg/hr)  
Dose: \_\_\_\_

See [Fever and Neutropenia Guidelines for children with cancer](#)

- Lehrnbecher T, Phillips R, Alexander S, Alvaro F, Carlesse F, Fisher B, Hakim H, Santolaya M, Castagnola E, Davis BL, Dupuis LL, Gibson F, Groll AH, Gaur A, Gupta A, Kebudi R, Petrilli S, Steinbach WJ, Villarroel M, Zaoutis T, Sung L. [Guideline for the management of fever and neutropenia in children with cancer and/or undergoing hematopoietic stem-cell transplantation](#). J Clin Oncol. 2012 Dec 10;30(35):4427-38. [PubMed Citation]
  - Editorial on this guideline: Pulsipher MA, [Pediatric-specific guidelines for fever and neutropenia: a catalyst for improving care and focusing research](#). J Clin Oncol. 2012 Dec 10;30(35):4292-3. [PubMed Citation]

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**NOTES**

1. FDA approved for this indication
2. This drug is not approved by the FDA for this indication. If used, this would be an "off label use", and physician discretion is strongly advised.
3. Ca-DTPA and Zn-DTPA have not been approved by FDA for treating internal contamination with californium, thorium, and yttrium. For initial treatment, Ca-DTPA is recommended, if available, within the first 24 hours after internal contamination. Zn-DTPA is preferred for maintenance after the first 24 hours, if available, due to safety concerns associated with prolonged use of Ca-DTPA.

**4. Pegfilgrastim (Neulasta): Weight-based Dosing for Pediatric Patients Weighing Less than 45 kg (from drug label dated 11/2015)**

Body Weight	Pegfilgrastim Dose	Volume to Administer
Less than 10 kg*	See below*	See below*
10 - 12 kg	1.5 mg	0.15 mL
21 - 30 kg	2.5 mg	0.25 mL
31 - 44 kg	4 mg	0.40 mL

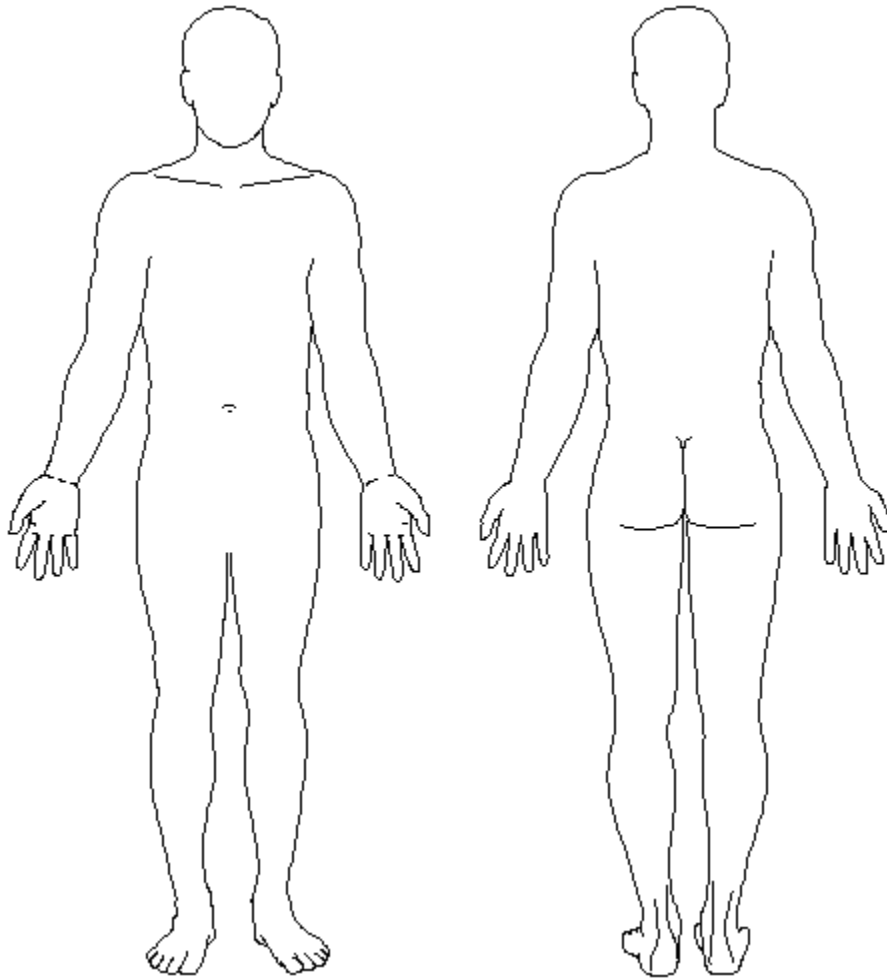
\* For pediatric patients weighing less than 10 kg, administer 0.1 mg/kg (0.01 mL/kg) of Neulasta.

See [drug label information](#) regarding how to administer drug for pediatric patients receiving doses less than 6 mg.

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**Body Chart for Recording Results of Radiation Survey**



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### Pediatric Vital Signs Reference Chart

This table, along with our detailed references can be found online at <http://www.pedscases.com/pediatric-vital-signs-reference-chart>. For a more detailed approach to this topic, see our podcast on "Pediatric Vital Signs."

Heart Rate			Respiratory Rate	
<b>Normal Heart Rate by Age (beats/minute)</b> Reference: PALS Guidelines, 2015			<b>Normal Respiratory Rate by Age (breaths/minute)</b> Reference: PALS Guidelines, 2015	
Age	Awake Rate	Sleeping Rate	Age	Normal Respiratory Rate
Neonate (<28 d)	100-205	90-160	Infants (<1 y)	30-53
Infant (1 mo-1 y)	100-190	90-160	Toddler (1-2 y)	22-37
Toddler (1-2 y)	98-140	80-120	Preschool (3-5 y)	20-28
Preschool (3-5 y)	80-120	65-100	School-age (6-11 y)	18-25
School-age (6-11 y)	75-118	58-90	Adolescent (12-15 y)	12-20
Adolescent (12-15 y)	60-100	50-90		
Blood Pressure				
<b>Normal Blood Pressure by Age (mm Hg)</b> Reference: PALS Guidelines, 2015				
Age	Systolic Pressure	Diastolic Pressure	Systolic Hypotension	
Birth (12 h, <1000 g)	39-59	16-36	<40-50	
Birth (12 h, 3 kg)	60-76	31-45	<50	
Neonate (96 h)	67-84	35-53	<60	
Infant (1-12 mo)	72-104	37-56	<70	
Toddler (1-2 y)	86-106	42-63	<70 + (age in years x 2)	
Preschooler (3-5 y)	89-112	46-72	<70 + (age in years x 2)	
School-age (6-9 y)	97-115	57-76	<70 + (age in years x 2)	
Preadolescent (10-11 y)	102-120	61-80	<90	
Adolescent (12-15 y)	110-131	64-83	<90	
For diagnosis of hypertension refer to the NHBPEP Reference tables: <a href="http://www.nhlbi.nih.gov/health-pro/guidelines/current/hypertension-pediatric-jnc-4/blood-pressure-tables">http://www.nhlbi.nih.gov/health-pro/guidelines/current/hypertension-pediatric-jnc-4/blood-pressure-tables</a> .				
Temperature		Oxygen Saturation		
<b>Normal Temperature Range by Method</b> Reference: CPS Position Statement on Temperature Measurement in Pediatrics, 2015		Normal pediatric pulse oximetry (SPO2) values have not yet been firmly established. SPO2 is lower in the immediate newborn period. Beyond this period, a SPO2 of <92% should be a cause of concern and may suggest a respiratory disease or cyanotic heart disease.		
Method	Temperature (°C)			
Rectal	36.6-38			
Ear	35.8-38			
Oral	35.5-37.5			
Axillary	36.5-37.5			
Temperature ranges do not vary with age. Axillary, tympanic and temporal temps for screening (less accurate). Rectal and oral temps for definitive measurement (unless contraindication).				

Developed by Chris Novak and Peter Gill for PedsCases.com.  
April 21, 2016.

Source: [PedsCases.com](http://PedsCases.com)

About: [PedsCases](http://PedsCases)