REMM
Prototype / Template for
Pediatric Hospital Orders
During a Radiation Emergency

Version: July 2024

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 and pregnant women 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.

Mass Casualty Emergency

- 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.
- This is **Version date July 2024 of the Pediatric Order set template.** Before using an order set that has been previously printed for use offline, consult the online version of REMM to see if updates are available.
  This REMM web page has the most recent version of both the adult and pediatric templates.
  https://remm.hhs.gov/adultorderform.htm

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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: _____

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 #25 in order set** for additional radiation details and work-up

Other potential complicating factors

___ Mass casualty incident

___ Other, Specify _____

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)

5. Urgent consultations: specify

__ Pediatric Hematology/Oncology

___Intensive Care

__ Transfusion Medicine

__ Hematopoietic Stem Cell Transplantation

___Radiation Oncology

__ Mental Health / Psychiatry

___Endocrinology

__ Ophthalmology

___Palliative Care and Pain Service

__ Dermatology / Plastic Surgery

___Gastroenterology

__ Radiation Safety

___Burn Team

__ Surgery:____General____Trauma____Thoracic ___Orthopedics

__ Hepatology

___Infectious Disease

__ Pulmonary

___Plastic Surgery

__ Cardiology

___Nephrology

__ ENT

___Social Services

__ Nutritionist/ Dietician

_Other

6. Condition:

__ Good _Fair _Stable _Guarded _Critical

7. Vital Signs: Temp, BP, Pulse, [Pulse Ox if needed]

__ q 2 hours X 4
__ q 4 hours X 4

___Other frequency: Specify:_____

Notify physician for:
O^2 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

Initiate sepsis workup for the following conditions:

Age	HR (95th %ile)	HR (75th %ile)	Systolic BP (5th %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
___ Ambulate in room only
___ Ambulate ad lib

10. Diet:

__ Regular Diet __ Liquids (full, clear) ____ NPO
___ Advance as tolerated
___ Low microbial diet (for neutropenia)
__ Special dietary needs/requests: _____

11. Height, weight:

Height:_____cm
Weight:_____kg

Repeat body weight: q_____hours q_____ days

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 ≥10 years or post-menarche, whichever is earlier)

___ Serum HCG (for any girls ≥10 years or post-menarche, whichever is earlier)

__ Thyroid Function Tests (Specify) _____

___ Wound cultures

__ See #13 in order set for blood bank labs including Type & Screen or Cross Match

Serologies:
__ Herpes Simplex Virus type 1 (HSV-1) [unless acyclovir prophylaxis planned]
__ Herpes Simplex Virus type 2 (HSV-2) [unless acyclovir prophylaxis planned]
___ Cytomegalovirus (CMV)
___ Varicella-zoster Virus (VZV)
____Epstein Barr Virus (EBV)

Standing labs / studies, if needed

__ 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)

13. Blood bank

(May set institutional transfusion parameters, e.g.: PRBC transfusion for Hgb < 7 g/dl and PLT < 20000/microL 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 **whole body dose of radiation 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

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. IV fluid management: (including requirements for burns, if present)

__ IV Fluids:_____@_____mL/hr, with additive _____

__ IV Fluids:_____@_____mL/hr, with additive _____

See REMM burn page for details of fluid replacement

17. __ Foley catheter management (specify) _____

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

18. __ Monitor I / O
Frequency _____

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

19. 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.

20. 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) _____

21. Wound care: (see also order set item #24 and REMM burn page)

___ 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 (but not face) Specify location, frequency:_____

_ Other topical silver impregnated burn treatment (e.g. Acticoat, Restore) Specify medication, location, frequency:_____

__ Other burn treatment: (e.g., ReCell) Specify:_____

__ **Bacitracin** topically to burns/BID

___ Plastic Surgery Consultation

___ Other wound management per **Burn Team / Dermatology / Surgery**: Pager_____Phone _____

__ Consider referral to American Burn Association Burn Center

22. Orthopedic care:

___Splint/brace/cast/crutches

___ Other orthopedic management procedure per orthopedics:

Pager _____Phone _____

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23. 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: _____

C. **Radiation bioassay** for evaluating/managing internal decontamination

- Collect ≥ 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.

24. 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** web site 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: _____
__ Hydroxyzine

_ **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: _____

_ **Hydroxyzine** (**Vistaril**) capsules and oral suspension
PEDS: children under 6 years: 50 mg daily in divided doses
children over 6 years: 50-100 mg daily in divided doses

__ **Prochlorperazine** for anxiety/insomnia/breakthrough nausea
PEDS: Children ≥2 years and weight ≥9 kg and Adolescents
(NOTE: Administer with **Diphenhydramine** to mitigate risk of dystonia.
Some prefer not to use this medication in children to avoid extrapyramidal symptoms.)

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 (Tylenol)** q 6 – 8h PRN temperature> 38 ºC
PEDS: 15 mg/kg, max 650 mg PO Q 6 hrs PRN. Max 75mg/kg/day
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 and itching (unrelated to radiation exposure):

__ **Topical steroid:** _____ Medication Name
___Cream/lotion/ointment ___Strength ___ Frequency___

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: **IV** 0.05 mg/kg Q 2-4 hrs PRN
Usual initial max dose:
Infants: 2 mg/dose
1 to 6 years: 4 mg/dose
7 to 12 years: 8 mg/dose
>12 years: 10 mg/dose

PO 0.2-0.5 mg/kg, Q 4 hrs PRN
Usual initial max dose: 15 – 20 mg

**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_____

For skin burns: (see also item # 21 in order set: wound care)
See also: REMM burn page for more details

Record burn area(s) on body diagram and % Body Surface Area affected
(See body chart on page 22)

Burn topical regimen _____

Replace body fluid _____

Other burn therapy _____

Consider referral to American Burn Association Burn Center: _____

For oral mucositis:

Mouth care regimen _____

25. 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
Ca-DTPA[1,3] **Zn-DTPA**[1,3] See REMM's DTPA information. See FDA's Zn-DTPA drug label. See FDA's Ca-DTPA drug label.	Americium (Am-241)[1] Californium (Cf—252)[2] Cobalt (Co-60)[2] Curium (Cm-244)[1] Plutonium (Pu-238 and Pu-239)[1] Yttrium (Y-90)[2]	**IV**[1]**:** 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. **Nebulized inhalation**[1]**:** DTPA is FDA-approved for nebulized inhalation in adults only, and if the route of contamination is through inhalation.	**IV:** 1 g in 5 cc 5% dextrose in PEDS: <12 years old: 14 mg/kg IV qd, no more than 1g/day **Nebulized inhalation:** 1 g in 1:1 dilution with sterile water or NS over 15-20 min PEDS: nebulized dosing same as adults	• Ca-DTPA for the first dose • Give Zn-DTPA for any follow-up doses (i.e., maintenance as indicated) • Duration of therapy depends on total body burden and response to treatment

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Medical Countermeasure	Administered for	Route of Administration	Dosage	Duration
Potassium iodide[1] See REMM's KI summary information. See FDA's KI information.	Iodine (I-131) [For projected thyroid gland exposure ≥ 5cGy]	**PO**	(**Adolescents ≥ 150 lbs.** should receive the full adult daily dose (130 mg/d) **Adolescents, 12 through 18 years:** 65 mg/d **Over 3 years through 12 years:** 65 mg/d **1 month through 3 years:** 32 mg/d [Use KI oral solution with 65 mg/mL.] **Birth through 1 month:** 16 mg/d [Use KI oral solution with 65 mg/mL.]	• See FDA pediatric dosing recommendations, including liquid vs. tablet options • Some incidents will require only a single dose of KI. • Incident managers may recommend additional doses if ongoing radioactive iodine ingestion or inhalation represents a continuing threat. • See also: Potassium Iodide (KI): Duration of Therapy. • See FDA information on duration of therapy.

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Medical Countermeasure	Administered for	Route of Administration	Dosage	Duration
Prussian blue, insoluble[1] See REMM's Prussian Blue summary information. See FDA's Prussian Blue drug label.	Cesium (Cs-137) Thallium (Tl-201)	**PO**	**PEDS:** **>12 yrs:** 3 g po TID **2-12 yrs:** 1 gm TID Prussian Blue in currently not approved for children < 2 years of age. During an actual emergency, consult with managers to see if EUA is available.	• Minimum 30 days course per FDA • Obtain bioassay and whole body counting to assess treatment of efficacy • Duration of therapy depends on total body burden and response to treatment

26. Neutropenia therapy and antimicrobials Neutropenia therapy, if indicated:

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

- The 3 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

Cytokine	Dose
G-CSF or filgrastim (Neupogen drug label)	• 10 mcg/kg/day as a single daily subcutaneous injection in adults and children (IV optional based on availability) • Continue administration daily until absolute neutrophil count remains greater than 1,000/mm^3 (= 1.0 x 10^9 cells/L) for 3 consecutive (daily) CBCs or exceeds 10,000/mm^3 (= 10 x 10^9 cells/L) after a radiation-induced nadir. • See REMM cytokines page for more information about potential dose alterations during large mass casualty incidents when medical countermeasures may be scarce.
Pegylated G-CSF or Pegfilgrastim-fpgk (biosimilar to Neulasta drug label).	• **Pediatric patients weighing less than 45 kg**: refer to table in Neulasta drug label[4] (on page 24-25 of this orders document) for dose calculated by weight. Administer two doses of drug subcutaneously one week apart, if second dose is needed • 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^3 (= 5.0 x 10^9 cells/L). • See REMM cytokines page for more information about potential dose alterations during large mass casualty incidents when medical countermeasures may be scarce.
Pegylated G-CSF or Pegfilgrastim-cbqv (biosimilar to Neulasta) (Udenyca drug label)	• **Pediatric patients weighing less than 45 kg**: refer to table in Udenyca drug label[5] (on page 24-25 of this orders document) for dose calculated by weight. Administer two doses of drug subcutaneously one week apart, if second dose is needed • 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^3 (= 5.0 x 10^9 cells/L). • See REMM cytokines page for more information about potential dose alterations during large mass casualty • incidents when medical countermeasures may be scarce.

Pegylated G-CSF or Pegfilgrastim-fpgk (biosimilar to Neulasta) (Stimufend drug label)	• **Pediatric patients weighing less than 45 kg**: refer to table in Stimufend drug label[6] (on page 24-25 of this orders document) for dose calculated by weight. Administer two doses of drug subcutaneously one week apart, if second dose is needed • 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^3 (= 5.0 x 10^9 cells/L). • See REMM cytokines page for more information about potential dose alterations during large mass casualty • incidents when medical countermeasures may be scarce.
GM-CSF or sargramostim (Leukine drug label)	• A subcutaneous injection administered once daily as follows-- • 7 mcg/kg in adult and pediatric patients weighing greater than 40 kg • 10 mcg/kg in pediatric patients weighing 15 kg to 40 kg • 12 mcg/kg in pediatric patients weighing less than 15 kg • Continue administration of Leukine until absolute neutrophil count remains greater than 1,000/mm^3 (= 1.0 x 10^9 cells/L) for 3 consecutive CBCs or exceeds 10,000/mm^3 (= 10 x 10^9 cells/L) after a radiation- induced nadir. • See drug label for prescribing information, especially warning related to diluent use in infants and premature infants. • See REMM cytokines page for more information about potential dose alterations during large mass casualty incidents when medical countermeasures may be scarce.
Pegylated G-CSF or Pegfilgrastim-fpgk (biosimilar to Neulasta) (Ziextenzo drug label)	• **Pediatric patients weighing less than 45 kg**: refer to table in Ziextenzod drug label[7] (on page 21 of this orders document) for dose calculated by weight. Administer two doses of drug subcutaneously one week apart, if second dose is needed • 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^3 (= 5.0 x 10^9 cells/L). • See REMM cytokines page for more information about potential dose alterations during large mass casualty incidents when medical countermeasures may be scarce.

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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 diagnosis of VZV or HSV; see drug label for details
PEDS:
Weight ≤ 40 kg: 60-80 mg/kg/**day** PO in 2-3 divided doses, with max 200 mg PO q8h
Weight > 40kg: 400 mg PO q 12 h
Dose: _____

Anti-fungal prophylaxis (neutropenia without fever)

[Note: Consider prophylaxis for Pneumocystis pneumonia in immunocompromised patients.]

__ **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.

Oral suspension: < 12 years: 4 mg/kg PO TID; >12 years: 200 mg PO TID
DR tablets: Adolescents: 300 mg PO twice daily on day 1, then 300 mg PO daily

Note: IV formulation is not FDA approved in children < 18 years of age because of "non-clinical safety concerns".

Note: FDA drug label cautions for this drug in pediatric patients, especially those < 13 years of age. Drug label includes various dosing options.

For treatment of neutropenia AND fever (defined as T>38 ºC while neutropenic)

Anti-microbial work-up and therapy

__ Blood cultures
__ Sputum culture + sensitivity
_Urinalysis w/culture
_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: _____

Antifungal therapy
[Note: Consider prophylaxis for Pneumocystis pneumonia in immunocompromised patients.]

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/m2 IV once, then 50 mg/m2 IV daily
(max dose 70 mg once then 50 mg daily)
Dose: _____

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

Oral suspension: < 12 years: 4 mg/kg PO TID; >12 years: 200 mg PO TID
DR tablets: Adolescents: 300 mg PO twice daily on day 1, then 300 mg PO daily

IV is not FDA approved in children < 18 years of age because of "non-clinical safety concerns".

Note: See FDA drug label cautions for this drug in pediatric patients, especially those < 13 years of age. Drug label includes various dosing options.

___ **Liposomal amphotericin B (AmBisome)** See drug label for cautions.
PEDS dose: 3-5 mg/kg/day IV over 2h
Dose: _____

___ **Amphotericin B lipid complex (Abelcet)** See drug label for cautions.
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.

5. Pegfilgrastim-cbqv (Udenyca)
Weight-based Dosing for Pediatric Patients Weighing Less than 45 kg (from drug label dated 03/2023)

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 Udenyca

See drug label information regarding how to administer drug for pediatric patients receiving doses less than 6 mg.

6. Pegfilgrastim-fpgk (Stimufend)
Weight-based Dosing for Pediatric Patients Weighing Less than 45 kg (from drug label dated 09/2023)

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 Stimufend.

See drug label information regarding how to administer drug for pediatric patients receiving doses less than 6 mg.

7. Pegfilgrastim-bmez (Ziextenzo)

Weight-based Dosing for Pediatric Patients Weighing Less than 45 kg (from drug label dated 02/2024)

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 Ziextenzo.

See drug label information regarding how to administer drug for pediatric patients receiving doses less than 6 mg.

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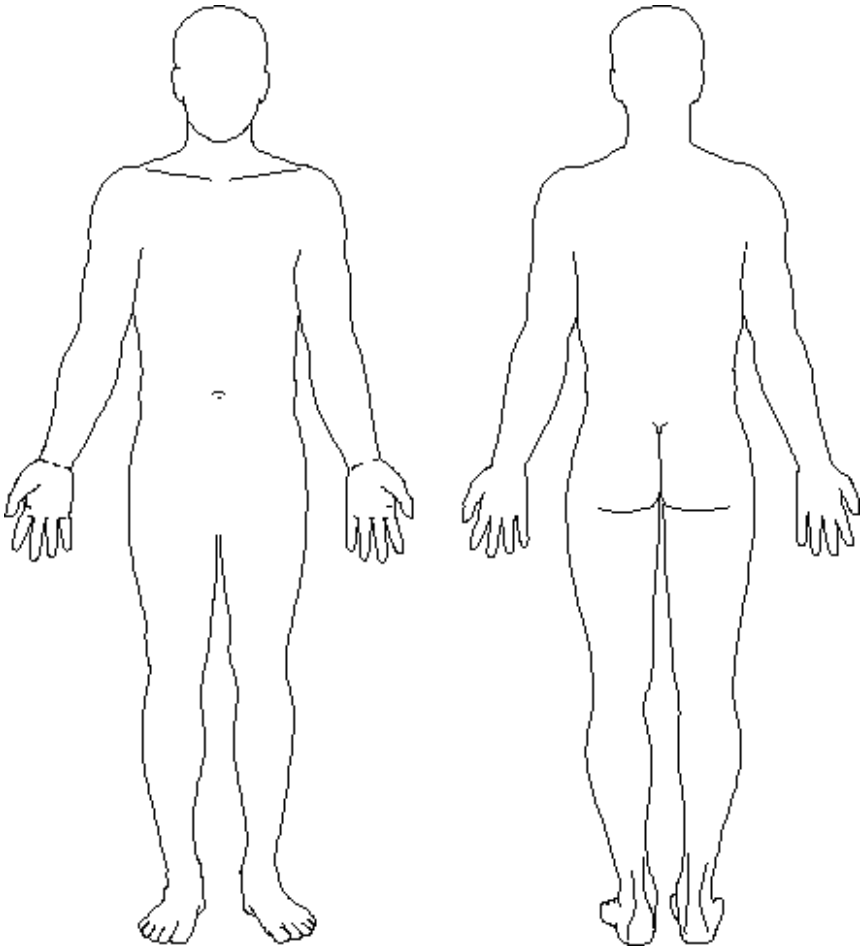
Body Chart for Recording Results of Radiation Survey and/or Burns



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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

Normal Heart Rate by Age (beats/minute)
Reference: PALS Guidelines, 2015

Age	Awake Rate	Sleeping Rate
Neonate (<28 d)	100-205	90-160
Infant (1 mo-1 y)	100-190	90-160
Toddler (1-2 y)	98-140	80-120
Preschool (3-5 y)	80-120	65-100
School-age (6-11 y)	75-118	58-90
Adolescent (12-15 y)	60-100	50-90

Respiratory Rate

Normal Respiratory Rate by Age (breaths/minute)
Reference: PALS Guidelines, 2015

Age	Normal Respiratory Rate
Infants (<1 y)	30-53
Toddler (1-2 y)	22-37
Preschool (3-5 y)	20-28
School-age (6-11 y)	18-25
Adolescent (12-15 y)	12-20

Blood Pressure

Normal Blood Pressure by Age (mm Hg)
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: http://www.nhlbi.nih.gov/health-pro/guidelines/current/hypertension-pediatric-jnc-4/blood-pressure-tables.

Temperature

Normal Temperature Range by Method
Reference: CPS Position Statement on Temperature Measurement in Pediatrics, 2015

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).

Oxygen Saturation

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.

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

Source: PedsCases.com
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