PICU HANDBOOK

2020-2021

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Introduction

Dear Residents and Students,

Welcome to the PICU!

This PICU Guide was written for you by members of the PICU faculty (attendings, fellows, and advance practice providers) and reviewed yearly to ensure that you have an enjoyable rotation and obtain the best possible PICU learning experience!

The attendings, fellows, nurse practitioners, physician assistants, pharmacists, and respiratory therapists are here to ensure your rotation is a successful one. As you journey through this rotation, please know that we are here to mentor you through the process. We value your feedback and welcome any questions or concerns you may have regarding the rotation itself, the educational goals and opportunities available to you, your interactions with staff and physicians, etc.

This manual will provide guidelines for our residents as it relates your residency training and learning environment to help avoid and/or resolve questions, problems, and misunderstandings as soon as they arise. Residents are encouraged to initiate

discussions with appropriate parties for the purpose of resolving issues in an informal and expeditious manner. You may approach any of the faculty members with any issues or come directly to Dr. Conrad Krawiec, MD (PICU Feedback Coordinator), Dr. Adrian Zurca, MD (PICU Rotation Director) or Dr. Duane Williams, MD (Critical Care Associate Medical Director) with your concerns. We want to ensure that our rotation meets your educational needs as learners, gives you ample opportunity to explore critical care medicine as a career opportunity, and fosters open communication between all members of the critical care team.

Please do not hesitate to ask questions or voice concerns.

Sincerely,

The PICU Staff

1. Evaluation and Feedback

Every month, the PICU faculty (attendings, fellows, nurse practitioners, physician assistants) collaboratively review a resident's performance and provide a rating among various different competencies. These ratings are generally determined by the PICU faculty's observation of the following:

1. Medical knowledge
2. Dedication to expanding your medical knowledge
3. Rounding Preparation (i.e. knowledge of patient details)
4. Performance during rounds (i.e. organization and ability to synthesize the information you are reporting)
5. Work ethic
6. Patient ownership
7. Inter-professional collaboration
8. Communication
9. Professionalism

You can expect to be given verbal feedback throughout your rotation and then more formally at the end of your rotation using the online evaluation tool based on the achievement of core competencies. **If your attending does not initiate a feedback discussion during their service week, we would ask that you approach the attending to ask directly for this feedback, preferably on Fridays. Please note that the attending's service week starts and ends on Tuesdays.**

Every year the PICU division reviews and identifies professional behaviors that are common and are known to impact a resident's

educational experience. These are reviewed during the evaluation process and are commonly utilized in feedback. Please avoid these behaviors:

1. Dress code (particularly the use of T-shirts) that make it difficult for families and nurses to identify the primary physician in charge for this patient
2. Lack of inter-professional respect resulting in verbal disputes regarding patient management or primary operator for procedures
3. Lack of presence in the unit during high acuity situations
4. Lack of patient ownership
5. Interruption of resident's presentation during rounds by attendings, fellows or APPs
6. Lack of patent reassessment
7. Lack of communication
8. Lack of efficient order writing and follow up

Further details regarding these behaviors are addressed in the PICU rotation manual

2. Staff Directory

PICU Attendings	PICU Advanced Practice Pro
Gary Ceneviva, MD	Abigail Adams, CRN
Theodore Demartini, MD	Ashley Derbyshire, C
Katie Even, MD	Krista, Kierys, CRN
Scott Halstead, MD, PhD	Sarah Lecher, PA-C
Robert Kavanagh, MD	Emily Pinos, CRNP
Elizabeth Kerris, MD	Emily Reeher, PA-C

Conrad Krawiec, MD	Beth Schneider, CRN
Benjamin White, MD	
Duane Williams, MD	
Adrian Zurca, MD	

Pediatric Cardiothoracic Surgery Attendings	
Joseph Brian Clark, MD	
John L. Myers, MD	

3. To Do List: Pre-PICU Rotation

☐ Identify and read about your assigned patients pre-PICU rotation (3rd year residents should be familiar with all patients)

☐ Be prepared to identify yourself to the nurse and family of your assigned patient on the first day of the PICU rotation

☐ Be prepared to place your name on the dry erase board on the patients you are covering that day

Review PICU documents and recommended educational materials

☐ Hershey PICU Rotation Manual

☐ PICU Passport

☐ American Heart Association Basic Life Support Review

☐ American Heart Association Pediatric Advanced Life Support Review

☐ Advanced Trauma Life Support Review

Please be familiar with the following since these are utilized regularly in the PICU:

☐ Common PICU conditions listed with the Pediatric Critical Care Study Guide

☐ Goal Sheet

☐ Sedation levels

☐ High flow nasal cannula guidelines

☐ Head injury guidelines

☐ Hypothermia guidelines for post-cardiac arrest

☐ Brain Death Evaluation – Hospital Policy

4. Patient Quality & Safety

1. ORDERS

One of the most critical documents in the electronic health record.

It is intended to convey to others very explicit instructions regarding the patients care.

Order mis-entry or omission will be considered a patient quality and safety concern as it may result in patient harm or near misses. All events regarding order entry will be reviewed by the PICU team to determine if patient safety event reporting necessary.

Orders are the primary resident's physician responsibility. Therefore, it is imperative that others are able to read and interpret your intentions. Order must be written, submitted in a timely manner, and with sufficient details to avoid misunderstanding.

There is no excuse for omitting, or entering unclear or inaccurate orders.

Please be sure to review your patient's orders several times a day to ensure that all the orders are necessary and appropriate. Check that:

- Every intubated patient receives a chest x-ray every morning
- The lab schedule is relevant, up to date, and that no labs are going to automatically "drop off" the order page.

It is YOUR responsibility to check all orders and make sure that they are up to date, appropriate and not scheduled to drop off for each of your patients.

This includes:

1. Triple-Checking Orders:
    a. Take a moment to check on your patients' active orders.
    b. Get rid of any old orders (e.g., CVP monitoring orders on a patient who had their central line removed 2 days ago).
2. Make sure ALL X-rays are ordered for the next morning (i.e., all intubated patients, patients with acute lung injury/pleural effusions/chest tubes, serial KUBs etc.).
    a. There is a PICU CXR order plan.
    b. Patients with a tracheostomy may not routinely need daily chest x-rays, unless there is something to be re-evaluated (i.e., change in respiratory support)
3. CHECK to make sure that necessary labs are not going to expire.
    a. The best way to assure this doesn't happen is to get in the habit of taking away the "duration" so labs will not stop unless discontinued.
4. Renew meds and orders that may expire such as:
    a. Restraints (which must be renewed every 24 hours)
    b. Medications like antibiotics and narcotics

c. Before they expire, a read hourglass icon (Hard Stop) will appear next to the order to remind you it needs to be renewed

5. Labs in the PICU are always on a scheduled starting at 4 am. Examples:
    a. Q6 labs @ 0400, 1000, 1600, 2200
    b. Q3 labs @ 0400, 0700, 1000, 1300, etc.

2. ORDER PLANS

In Power Chart, you will find several PICU order sets. These were meticulously designed to assist the resident staff in placing orders and caring for the patients in the PICU.

Please use every opportunity to utilize them as they will decrease your workload and increase patient safety.

These are updated and revised as needed.

PICU Admission

PICU Antimicrobial Therapy

PICU Chest XR Series

PICU CV Infusions

PICU Electrolyte Therapy

PICU ECLS

PICU Gift of Life

PICU ICP Monitoring PICU IV Fluids

PICU Laboratory

PICU Misc Medications

PICU PA Catheter

PICU Pulmonary Meds PICU Sedation/Analgesia

PICU Therapeutic Hypothermia

PICU Vent Evita PICU Vent LTV PICU Vent Servo

PICU/PIMCU Vital Signs & I&O

Peds CT Surgery Post-Op Step 0

Peds CT Surgery Post-Op Step 1

3. DAILY ICU SAFETY REVIEWS

Continued need of the following should be reviewed daily, during interdisciplinary PICU rounds to reduce the risk of a hospital acquired event (hospital acquired infection)

- Central line
- Foley Catheter
- Sedation needs if requiring mechanical ventilation

4. RESTRAINTS

Most commonly utilized to prevent removal of endotracheal tubes, arterial catheters, and central venous catheters to ensure the patient's safety.

Restraint requirements should be reviewed daily and an order for restraints should be ensured.

5. TISSUE PLASMINOGEN ACTIVATOR (TPA) FOR CENTRAL VENOUS LINES

Central line catheters can become sluggish or occluded due to thrombus or fibrin clot formation. If this occurs, alteplase (tPA) should be administered as it is an enzyme that converts plasminogen to plasmin which then degrades the fibrin existing in the blood clot. A PICU order plan is available for weight/line based recommendation for dosing.

Catheter thrombosis is a recognized risk factor for development of a CLABSI (central line associated blood stream infection). Thus, if alteplase (tPA) is being administered for a suspected central line catheter thrombosis, please also order a one-time dose of piperacillin and tazobactam (Zosyn).

5. Learning Objectives

At the end of this PICU rotation, the resident will be able to:

1. Place the interests of patients and populations at the center of inter-professional health care delivery, with the goal of promoting health and health equity across the life span.

2. Formulate an initial treatment plan for a critically ill child (including prioritization of different diagnostic and therapeutic options)

3. Use the disease trajectory and response to prior interventions to propose changes to a patient's care plan.

4. Demonstrate the ability to effectively counsel families of critically ill children (including the transition to end of life care).

5. Integrate the knowledge of other professions (sub-specialists, critical care nurse practitioners, critical care physician assistants, pediatric intensive care unit nurses, and respiratory therapists, critical care pharmacists) to inform care decisions, while respecting patient values and priorities/preferences for care.

6. Engage other healthcare professionals (sub-specialists, critical care nurse practitioners, critical care physician assistants, pediatric intensive care unit nurses, and respiratory therapists, critical care pharmacists) in shared patient-centered problem-solving.

7. Compare different treatment modalities for pain and anxiety management in the postoperative or critically ill child.

8. Describe the indications for invasive procedures (endotracheal intubation, central line placement, arterial line placement, and chest tube placement) in the PICU, how these are performed, and their complications.

6. Procedural Expectations

By the end of the rotation, the resident will have gained experience with and/or be able to perform the following procedures either independently or with minimal supervision:

1. Bag-mask ventilation (Simulation and/or Clinical Opportunity)
2. Endotracheal intubation (Simulation)
3. Arterial Puncture (Clinical Opportunity)

4. Intravenous catheter insertion (Clinical Opportunity and/or Simulation)
5. Lumbar Puncture (Simulation and/or Clinical Opportunity)

Residents will be given the opportunity to participate in the procedures involving their patients as an assistant or an educational observer in which there is active discussion on the risks/benefits of the procedure, the appropriate technique for performance of the procedure, and the potential complications of the procedure.

To maintain high quality patient care and safety, we require that our PICU attendings, PICU fellows, PICU nurse practitioners, and PICU physician assistants maintain their proficiency in critical care procedures. These procedures will preferentially belong to these clinicians. Thus, during the course of the rotation, residents should NOT be expected to primarily perform the following procedures:

1. Endotracheal Intubation
2. Arterial line insertion
3. Chest tube insertion
4. Central Line Insertion

7. Professionalism

During your PICU rotation, you are considered an important member of a dedicated inter-professional team tasked with carrying for some of the most fragile, complex, critically ill children in the hospital. You will be expected to:

1. Behave professionally
    a. Be mindful of your words and actions
    b. Please treat others with respect, regardless of their role on the team
    c. Avoid bad-mouthing or ridiculing other services, families, and patients
    d. Recognize your triggers (fatigue, stress, hunger and hypo-caffeinemia are common ones) and anticipate needing to keep closer track of your behavior in those situations

2. Dress professionally whenever you expect to be in a patient care area
    a. Residents and students should be expected to wear scrubs or “business casual” attire
    b. White coats are optional
    c. Jeans, t-shirts, and open-toed shoes are NOT considered professional attire

3. Be on Time and Present

a. The PICU rotation is an inpatient experience that lasts 4 weeks. Vacation during this time period is discouraged and if requested, must be approved by your Residency Director and/or Chief Residents, and the Rotation Director
    i. Do NOT expect immediate approval
b. You will be excused for mandatory residency meetings (i.e. conferences).
c. If you are leaving the unit, please be certain you signed out the patient to a healthcare provider (i.e. fellow resident, PICU fellow, PICU nurse practitioner, PICU physician assistant)
d. Be certain the nurses managing your patient are verbally notified that you will be leaving the unit and please change your name on the dry erase board

8. Educational Opportunities

PICU PATIENT:

Using the stated learning goals and objectives modeled after the ACGME core competencies, we expect our residents and students to improve their critical thinking skills and to learn to critically appraise and integrate components from physical exam, laboratory data, radiographic studies, and physiologic monitoring devices into a comprehensive problem-based assessment and management plan for their patients.

PICU ROUNDS:

We will encourage you to share the knowledge you've acquired with the team verbally on rounds, by dissemination of interesting articles you have identified to team members, or by asking you to give an informal talk on a topic of particular interest to you. Not only will this provide an opportunity to hone your teaching skills, but it will imprint the information more firmly in your memory. Faculty is also dedicated to providing teaching during rounds and will make every effort to do so.

PICU ENVIRONMENT:

It is essential that our residents and students recognize early signs of physiologic deterioration which, when acted upon appropriately, may prevent worsening in a patient's condition. These skills are vital and

the PICU presents the ideal environment in which to observe these important physiologic processes as they evolve over time and in response to specific therapies. Therefore, the learner will have ample opportunity to admit critically ill patients and be able to reassess and reevaluate them constantly throughout a shift.

The PICU environment allows our residents and students to gain experience making independent management decisions in an environment in which they are supported and have a “safety net”.

DOWN TIME IN THE PICU:

During the course of the rotation, “down time” may occur which we expect you use wisely by reading about the disease processes of the patients on your team, re-evaluating patients, and checking in with nurses and families. We encourage you to utilize the Pediatric Critical Care Study Guide and this PICU manual as starting points for common topics.

PICU DIDATIC ACTIVITIES:

Our residents and students are invited to attend:

1. Attending Sign out Rounds
    a. Take place weekly on Tuesdays between the hours of 2:00pm and 3:30pm
2. Fellow Scholarly Curriculum Lectures
    a. Take place weekly on Tuesdays between 4 pm and 5 pm in P4205.

3. PICU Secondary Attending Informal 20 minute lecture
    a. Varies in time and location, but occurs primarily on Tuesday Mornings.
4. Simulation Sessions facilitated by Dr. Adrian Zurca, MD
    a. Dates and Times Vary based on Resident, Nursing, Respiratory Therapist, Pharmacist, and Student Availability

9. Educational Hurdles

PICU ENVIRONMENT:

In this healthcare environment, residents, students, and faculty members are at increased risk for burnout and depression. Psychological, emotional, and physical well-being are critical in the development of the competent, caring, and resilient physician. This can impact not only your well-being but your educational experience. Self-care is a vital component of professionalism; it is also a skill that must be learned and nurtured in the context of other aspects of residency training. To help combat this possibility, our faculty is committed to assisting you in:

1. Spending time with your patients
2. Promoting progressive autonomy and flexibility
3. Enhancing inter-professional relationships with fellow physicians,

nurse practitioners, physician assistants, nurses, respiratory therapists.

4. Paying attention to your scheduling, work intensity, and work compression that impacts resident well-being
5. Recognizing the symptoms of burnout, depression, substance abuse

PATIENT REASSESSMENT:

All faculty members (attendings, fellows, nurse practitioners, and physician assistants) agree, practice, and model patient reassessment. Issues and patient changes often occur during these reassessments. This often results in residents and students not realizing or missing a patient change. Thus, if you do not adapt this practice, you may be inadvertently left out of patient decisions.

While faculty members (attendings, fellows, nurse practitioners, and physician assistants) will make every effort to update you and discuss the decision making process, the responsibility is ultimately only yours as the patient is your responsibility. Please do the following:

1. Reassessing your patients constantly (once every 30 minutes for non-acute patients)
2. Ensuring that the nurse has identified you as the primary caregiver for the patient (i.e. write your name on the dry erase board, informing the nurse you are the primary caregiver, and informing the nurse who to communicate with if you are not present).

3. If you are assigned a critically ill patient that is experiencing a physiologic deterioration requiring constant reassessment and intervention, please reserve a computer on wheels and station yourself preferably inside (if there is space) or outside the patient's room. Otherwise, leave the computer on wheels outside the room and be prepared to move in and out of the room to be able to participate in the patient's care.

INTER-PROFESSIONAL COLLABORATION:

Research consistently shows that competent, inter-professional teamwork (between physicians, nurses, nurse practitioners, physician assistants, respiratory therapists, fellows, pharmacists, attendings) is pivotal to patient safety.

With the exponential increase in knowledge, the progressive specialization of health care professionals, and the declining working hours of physicians, trends in health care require an increasing interdependence of all health care professionals. Despite health professionals recognizing the importance of inter-professional teamwork, ineffective inter-professional teamwork remains ubiquitous potentially primarily impacting patient safety and your education.

Because our PICU depends on the interdependence of all health care professionals, the following is must be done to be able to work successfully and efficiently

together to ensure patient safety and ensuring a great educational experience:

1. Research consistently shows that personal attitude than on specific clinical knowledge influences team management. Our faculty (attendings, fellows, nurse practitioners, physician assistants, nurses, and respiratory therapists) are combatting this by committing to fostering a culture of respect. We expect our residents and students to commit to this as well.
2. Three behaviors that drive learning in an inter-professional environment such as ours. Thus, the following will be encouraged by our faculty (attendings, fellows, nurse practitioners, physician assistants, nurses, and respiratory therapists).

   This includes:
   a. Speaking up:
      i. Our faculty will make an effort to ensure psychological safety and trust to empower our residents and students to report, assess, and discuss patient issues and/or treatment plans.
      ii. We will make every effort to motivate this behavior and provide feedback to facilitate learning.
   b. Autonomy:

i. We want our residents and students to be involved in all management decisions. Our goal is that the resident (and the student under direct supervision of the resident) will be contacted first with issues regarding their patients to be given the opportunity to make an assessment of the problem and come up with a solution under direct and indirect supervision. In cases of emergency or when the resident is unavailable, it is our expectation that the actions taken by another team member will be discussed directly with the resident as soon as possible.

c. Reflection
    i. We want our residents and students to particularly understanding why things happen and why some decisions lead to specific outcomes. In cases in which the learner makes an erroneous decision, the decision will be corrected and there will be an educational discussion which takes place to

assess and redirect the learner's critical thinking on the issue at hand.

10. Roles and Responsibilities

Role	R
Third Year Medical Student	Develop proficiency in history taki differential diagnosis, and establis your supervisor and help guide yo
Acting Intern	In addition to the above responsib will be expected to take more resp more proactive in the managemer

	more independently while collabo required to review cosign your not and cosign any orders placed durir
Residents	All residents are expected to have rotation. For a third year resident, month by the program. The third y to be familiar with all patients in th be a resource for the second year resident staff. You will facilitate ap remainder of the team.
Fellow **Nurse Practitioner** **Physician Assistant**	At least two (either fellow, nurse p in the unit every day to assist with practitioner/physician assistant wi triage PICU patients. The fellow/n communicate with physicians from admissions/transfers.

11. Patient Ownership

It is our desire that the residents learn to critically evaluate patients and their data and learn to synthesize this information into a cohesive, problem-based assessment and management plan. In order to practice and receive evaluation and feedback on these skills, the resident must take ownership of each of his/her patients and be viewed by all members of the care team as the patient's primary physician.

Residents will act as the primary caretakers for all PICU patients, with the exception of pediatric cardiothoracic surgery patients (unless the pediatric cardiothoracic surgery physician assistant is not present). This includes primary medical decision making, computer order entry, documentation, and communication with families, medical subspecialists, and primary care physicians.

It is our expectation that the residents will be involved in all management decisions. Our goal is that the resident should be contacted first with issues regarding their patients and be given the opportunity to make an assessment of the problem and come up with a solution. In cases of emergency or when the resident is unavailable, it is our expectation that the actions taken by another team member will be discussed directly with the resident as soon as possible. In cases in which the resident makes an erroneous decision, the decision will be corrected and there will be an educational discussion which takes place to assess and redirect the resident's critical thinking on the issue at hand.

At the beginning of each shift (6:00am for day residents, 5:00pm for the night call residents), residents should print their name and pager number on the dry erase boards in the rooms of the patients they will be caring for that day so that the bedside staff will know who to call with questions. This should be done every day.

Residents and students are expected to update the families of their patients every day, to update them in a timely manner when the condition of a patient or the plan of care of a patient changes, and to participate in any additional discussions that take place with the family including care conferences, end of life discussions, etc.

As the primary caregiver of the patients, the residents also have a responsibility to escalate to a higher level of care when there is uncertainty in a given situation or when a member of the bedside staff questions the learner's plan of care (first to the fellow or advanced practice provider and then on to the attending). The attending, fellow, and advance practice

providers are there to act as resources to educate and guide the residents through the management of these often complex patients, not to entirely usurp the resident's authority.

As the primary caretaker of the patients, the learner also has an obligation to keep other team members updated on the clinical condition of the patients, results of labs/tests that are completed, and recommendations of consulting physicians.

Surgical Patients:

Patients on surgical services (ICU and patients downgraded to IMC level) will continue to be followed jointly by the PICU and surgical teams; as such, the appropriate surgical resident and/or attending should be notified of acute changes and major shifts in plans of care for their patients.

While it is discouraged, the surgical teams may write orders for patients being admitted directly from the operating room. These orders should be carefully reviewed by the PICU resident.

The surgical attending should be listed as the attending of record for patients admitted directly to the PICU from the operating room and for trauma patients admitted from the emergency department.

12. Daily Schedule/Workflow/Tips

DAILY ROTATION ROUTINE - PREROUNDS

- Receive sign out and examine patients
- Place your name on the dry erase board to signify your role in managing this patient.
- Utilize EHR to obtain additional clinical data
- Develop treatment and plan (APCs/Fellows are available to discuss treatment plan if desired)
- Expect APC/Fellow to treat acute issues on your patients, but plan to develop differential diagnosis and assist in the decision making process when they approach you with an update.
- Expect to receive incoming clinical data (i.e. I-STAT arterial blood gases) and under direct/indirect supervision be prepared to assess and provide an intervention.

DAILY ROTATION ROUTINE – X-RAY Rounds

- Review X-rays before rounds and ensure your patient is safe (i.e. lines and tubes in correct position, lack of acute pathology such as pneumothorax)
- Identify yourself as the primary resident and read the X-ray
- Expect and welcome critiques from APCs, Fellows, & Attendings regarding the interpretation of the X-Ray.
- Justify the continued need for daily chest x-rays

DAILY ROTATION ROUTINE – NURSING Driven Rounds

- Find your patient's nurse so that an introduction and an overview of the nursing/medical care of the patient is presented.
- Identify yourself to the nurse and family (if present) as the primary resident.

If you are not the primary resident, be prepared to listen, find supplementary clinical data, and enter orders on behalf of the primary resident

- Present a one-liner of your patient and pause to allow nursing to complete their portion of the presentation.
- Present your patient and outline your treatment plan.
- Expect critiques and revisions of the plan from APP/Fellow and attending.
- Participate in finalization of the plan (i.e. ensure cultures are obtained before initiation of antibiotics)
- Ensure there are no other nursing or family concerns.
- Provide an overview of the plan and be prepared to justify the treatment plan as outlined.

*** If you are not going to be available in the afternoon due to conference, clinic, etc., please notify the nurse of this change at the end of your shift***

*** You are expected to be on rounds, thus all residents are excused from patient admissions, but are expected to pick up the patient immediately after rounds. You are required to attend Pediatric Code Blues, Level 1 and Level 2 Trauma alerts, thus at least one resident may excused from rounds to attend these educational opportunities***

DAILY ROTATION ROUTINE – AFTER ROUNDS

- Pick up and review clinical data on any patient admitted during rounds and assigned to you.
- Walk to the nurses of your patients, advise them that rounds have ended, and that you will be (or continue to be) the primary resident for the patient.
- Reassess your patient and be prepared to do so at various times throughout the rest of the day.
- Participate in the sign out of the secondary attending to the primary attending to ensure the plans outlined on the secondary team are consistent and will be implemented.
- If your patient has 2 or more organ systems that are impacted and are continuously changing (i.e. addition of vasoactive infusions, etc), please advise your fellow residents, APCs, and Fellows that you will be primarily at this patient's bedside. Please reserve a computer on wheels and station yourself near this patient to participate in the patient's care until resolution.
- Follow up and implement the treatment plans outlined during rounds.
- Continuously review, assess, and treat incoming clinical data.
- Be prepared to admit patients to the PICU (including obtaining history and physical, entering orders, and most importantly, participating in the critical care of the patient admitted) and to attend Pediatric Code Blues, Level 1 and Level 2 Trauma alerts

DAILY ROTATION ROUTINE – 2pm to 3pm – RUN THE LIST

- Be prepared to provide a brief update on the status of your patient, any acute issues or changes, progress of the treatment plan, and recommend and justify any changes that are to be made.
- Implement any changes made during running of the list.
- Start to make preparations for sign out including ensuring that the patient's condition is stable (or if unstable, it is being addressed), all nursing concerns are addressed, orders are updated, tasks are completed, and the treatment plan has been successfully implemented.

SIGNOUT – 5pm

- Sign out your patient
- Listen to the sign out of patients where you are not the primary resident.
- Be prepared to review and update orders on your patients on changes that were made during signout rounds.

OVERNIGHT CALL – 5pm-7am

- Review the signout and clarify any clinical questions you have on the management of the patients that were signed out.
- Walk around the unit and introduce yourself as the primary overnight resident to ensure the PICU nurse can identify you with updated clinical changes and data that occur during the course of the night.
- Manage the patients and admissions (including obtaining history and physical, entering orders, and most importantly, participating in the critical care of the patient admitted).

TUCK-IN ROUNDS – 11p-12a

1. Under supervision of the APP/Fellow and/or Attending, please be prepared to walk around the PICU to check in with bedside nurses, address any clinical concerns, update orders, and to reaffirm your presence as the primary overnight call resident.

SIGNOUT – 6:00 - 6:30am

- Sign out new admissions and overnight changes to the resident team.
- Please be prepared to justify why changes to the treatment plan were made.

Faculty Workflow Tips:

1. **This month will be intense:**
    a. Our PICU acuity level is high.
    b. Be involved in your patient's care, prepare to be busy, and ready to LEARN.
2. **Prioritize!**
    a. Assure septic patient receives antibiotics within an hour of order being written; vasoactives within 30 minutes of order being written
    b. Your responsibility does not end at putting in the order
        i. Ensure the nurse has seen the order and is working on implementing it
3. **Please remain in the unit and accessible throughout the day**
    a. We understand there are always exceptions, but these should be cleared well in advance by the attending). Likewise, there will be times when you NEED to leave the unit (i.e., to go to a trauma or accompany a patient to a study).
    b. PLEASE ALWAYS LET THE ATTENDING, FELLOW, NP, OR CHARGE NURSE KNOW THAT YOU ARE LEAVING (THIS INCLUDES IF YOU GO TO LIE DOWN AT NIGHT).
    c. When you get back, get an update on what happened while you were gone.
4. **Nurse Practitioners, Physician Assistants, and PICU Fellows:**
    a. Nurse practitioners, physician assistants, and PICU fellows are your primary resource. They are extremely well educated regarding pediatric critical care.

b. We encourage bedside nurses to come to you first. Nurse practitioners, physician assistants, and PICU fellows will do their best to include you in the conversation, but it is primarily YOUR responsibility to stay informed on your patient. Every attempt will be made to optimize communication.

5. **Off-service patients:**
    a. Pediatric Surgery and the Surgery Subspecialties (Ortho, ENT, Neurosurg, etc) will have patients in the PICU who are admitted to their service.
    b. The PICU team still has a responsibility to see these patients, round on them and provide coordinated/concurrent care.
    c. We typically manage fluids/electrolytes, vent settings, and sedation issues.
    d. The primary service should be made aware of any transfusions given, and significant patient care issues or changes.
6. **Ask Questions:**
    a. If you have any questions, concerns, or thoughts – Ask!
7. **Follow Up and Keep Track!**
    a. Assure that orders are completed including but not limited to radiologic studies, cultures, consultant recommendations
    b. Keep track of daily labs, results of radiology studies, biopsy results, etc.
8. **Be your patients' doctor**
    a. You are the primary doctor of all your patients. Make sure the nurse, family, team, respiratory therapists know this. If you are post-call or are leaving for the day for an excused activity, notify the pertinent parties that you normally would outside of the PICU (i.e. the nurse, the team, etc.) and ensure your patient is covered by another resident.
9. **BE PRESENT and CIRCLE THE UNIT:**
    a. The more you are in the unit, the more you see, the more you do, and the more the nurses will come to you with issues on your patients.

13. Primary/Secondary Rounding Teams

The PICU utilizes a three-team rounding structure on weekdays

	Primary Team ("Blue" Team)	Secondary Team ("Gray" Team)	Pediatric Cardiothoracic Surgery Team (Part of "Blue Team")
Team Leader	PICU Attending	PICU Attending	PICU Attending Pediatric CT Attending
Primary Mid-Level	APP or Fellow	APP or Fellow	Peds CT Surgery APP
Secondary Mid-Level	APP or Fellow	APP or Fellow	Peds CT Surgery APP
Patient Type	Medical-Surgical Patients	Medical-Surgical Patients	Peds CT Surgery Patients
Level of Care	PICU for all medical patients, PIMCU or PICU for all surgical patients	PICU for all medical patients, PIMCU or PICU for all surgical patients	PIMCU or PICU
Census	14 patients	Varies (If Primary Team has more than 14 patients, Secondary team will take the extra patients)	Varies
Rounding Start Time	8:00am	10:00am	10:00am
Progress Note Writing	Residents writes notes Post-Call Resident excused from writing notes if presenting patients on morning rounds	Residents writes notes Post-Call Resident excused from writing notes if presenting patients on morning rounds	Only PICU Attending Writes Notes

Patient Type

- We round on Medical Patients requiring PICU and PIMCU level of care admitted under the pediatric care service. We provide concurrent care (and thus round on) patients admitted to surgical services (pediatric surgery, pediatric otolaryngology,

pediatric neurosurgery) requiring PICU and PIMCU level of care (but NOT floor status).

- We do not round on patients who are on another medical service with a level of care of PIMCU or Floor or were transferred to a medical service (pediatric hospitalist, pediatric hematology/oncology, pediatric pulmonary, pediatric nephrology, pediatric cardiology). We do not round on patients who are admitted to a surgical service who have a Floor level of care.

Team Composition:

- Primary PCCM attending
- PCCM fellow(s)
- PICU APP(s)
- Bedside Nurse
- PICU pharmacist
- Residents (Peds, Med-Peds, ED)
- Respiratory Therapists
- Subspecialists (i.e. Neurology, Oncology, etc.)

Resident Expectations

- To pre-round and be prepared to present all Medical-Surgical Patients requiring PICU and PIMCU level of care that are admitted to the pediatric critical care service or a surgical service
- Residents do not present Pediatric CT surgery patients unless it is a weekend, holiday, or lack of Pediatric CT surgery APP presence.

14. Note Writing

1. **Progress Notes:**
    - **a.** Residents are required to complete progress notes on all the patients they present during rounds.
    - **b.** Progress notes should be completed and sent to the responsible attending for signature by 2 pm
    - **c.** Exceptions:
        - i. Residents will not be required to write pediatric cardiothoracic surgery notes even if they were assigned or presented the patient.
        - ii. Post-call residents are excused from writing progress notes.
            1. Please note: post-call residents should still plan to write History and Physical notes for any patients they admitted during their shift (see below)
        - iii. If the attending excuses you from writing a progress note.

2. **History and Physical Exam Notes:**
    - **a.** If an admission comes during your shift, the note is your responsibility.
    - **b.** If you were not present entirety of the admission/stabilization/management of the patient because you were on rounds or excused for mandatory conference, the advance practice provider or fellow will be responsible for writing the accept note or history and physical exam note.

3. **Discharge Summaries:**
    a. All residents are responsible for dictating the discharge summaries within 24 hours of the discharge.
    b. In the discharge order, identify the resident responsible for the dictation.

4. **Discharge instructions:**
    a. Please start discharge instructions upon admission of any medical patients.
    b. These forms follow the patient and summarize their care throughout their hospital stay.
    c. They should be initiated even if the patient is not anticipated to be discharged home from the PICU.

5. **Patient Accept Notes, Transfer Notes, Orders and Off Service Notes:**
    a. The resident should complete accept and transfer notes for each of their primary patients who are on the intensive care service.
    b. Notes should be completed as soon as transfer is anticipated, as the on-call team should not be expected to do this.
    c. When coming off service (or when your rotation ends), please update the hospital course.

15. Admissions

- All admissions are only to be accepted by the PICU attending or PICU fellow.

- If you receive an admission call, refer the caller to the PICU attending or PICU fellow so they may obtain necessary information and determine the patient's disposition.
    - Any disputes about placement of the patient will be done at a faculty level.

- If you are admitting a patient, it is your responsibility to assess the patient IMMEDIATELY upon their arrival to the unit.

- Many times there are several nurses, the attending, the NP, the fellow, and the transport team around the bed when a patient arrives. DO NOT get lost in the background.

- This is going to be YOUR patient….be sure you can hear the transport team's sign-out.

- You are responsible for writing the H&P (or accept note on a surgical service patient or medical upgrade), entering admission orders, and ensuring that the paperwork relevant to ensuring high quality patient care is reviewed to ensure a smooth transfer transition (including uploading of radiology discs, review of the transfer chart to determine timing of antibiotics, medications, and interventions, if applicable).

- Due to the nature of the critical care unit, it is often important to get the orders done first and then write your H&P once the patient is stabilized.

- Always ASK if you have questions about admission orders.

- You should be prompted by either the PICU attending, fellow or APP to discuss your assessment and a complete systems-based plan. If they do not do so, please initiate the discussion yourself to ensure all aspects of the patient's care are addressed.

16. Traumas

- The number for listening to trauma information is 7077.

- PICU residents are designated first responders to pediatric trauma activations. (Hence the need for ATLS to have been completed prior to the PICU rotation.)

- Your role:
    - Primarily to be the pediatric resource for the surgical and ED team.
    - You will be expected to help facilitate the rapid transfer of the patient from the trauma bay to the PICU.
    - Communication with the PICU is imperative. Call the fellow/attending/charge nurse to inform them of an admission so that the bed and nurse assignment can be facilitated quickly.

- Level 1 Trauma – PICU Attending or fellow/nurse practitioner, and resident presence required in the trauma bay

- Level 2 Trauma - PICU Resident presence required in the trauma bay

15. Overnight Call Expectations

We acknowledge that nights on call in the PICU can be overwhelming. Here are some tips from the faculty to help enhance your success:

1. The most important thing to remember is that YOU ARE NEVER ALONE. The fellow, nurse practitioner, physician, or attending would ALWAYS rather have you call them with questions or concerns rather than acting independently if you are unsure of the plan.

2. Consider the PICU nurses and respiratory therapists as resources. If they are concerned about a patient, the best course of action is to evaluate and discuss the patient at the bedside. If they appear uncomfortable with your planned action (or inaction), this may be a reason to call for assistance.

3. You should have a plan in mind when you call a PICU attending, fellow, nurse practitioner, and physician assistant.
    a. Example: It is poor form to call in the middle of the night and have the following interaction…"Bed 10 is hypotensive….pause….what is his heart rate?.....uh, I'm not sure right now…..what is his CVP?….uh, hang on a minute…..(you get the point). Instead, have all the data available, formulate your idea of why the patient is hypotensive (in a timely manner), and present your plan to the attending with a concise presentation. "Bed 10 is hypotensive with a BP of 60/40, HR of 180, his urine output and CVP has decreased, and he has a very negative fluid balance. I think he is volume depleted and would like to give a fluid bolus of 10cc/kg.

4. Follow through on all care plans formulated on rounds.
    a. If the goal was to ensure the patient's fluid balance is negative by the morning, please ensure it is.

5. **Do not hesitate to contact the PICU fellow, nurse practitioner, physician assistant, attending with any changes that deviate from the care plan that has been discussed. For example:**
    a. If the goal was to ensure the patient's fluid balance was negative, but the patient appears to be volume depleted, this should be discussed.
    b. If a patient on high flow nasal cannula has worsening respiratory distress and feel that patient requires a higher flow rate, this should be discussed.
    c. If a septic patient is requiring fluid boluses or you are adding another vasoactive agent, this should be discussed.

6. In the early hours of the morning, it is your responsibility to look at ALL morning x-rays and labs.

a. This is important so that a mal-positioned ET tube, pneumothorax or hyperkalemia are addressed as soon as possible.
b. If an ET tube needs to be emergently adjusted (ex., ET tube barely reaching T2 in a patient on the oscillator), inform the nurse and fellow/attending.
c. Re-positioning an ET tube poses a risk of losing the patient's airway; and thus requires that a practitioner with advance airway skills (i.e., PICU fellow/nurse practitioner/physician assistant/attending) must be notified and physically present in the PICU during re- positioning.

16. Consultations

Residents will be requested to order and call for consultations for pediatric critical care patients.

Any recommendation offered by the consultant (including Gift of Life), should be reviewed by the PICU attending, fellow, nurse practitioner, or physician assistant before implementation.

This is to avoid patient safety issues as the critical care team is responsible for all organ systems (as the intervention recommended may have an impact on other compromised organ systems).

Examples include:

1. Ordering an MRI for a patient who is hemodynamically unstable or has a critical airway.
2. Ordering midazolam infusion or Pentobarbital for a patient who is in status epilepticus without preparing for the hemodynamic and respiratory consequences associated with it (i.e. myocardial depression, hypotension).
3. Changing antibiotic coverage for a patient with still undifferentiated sepsis
4. Removing an EEG for a patient with unexplained encephalopathy or high risk of seizures
5. Ordering blood samples for Gift of Life in an infant resulting in a blood transfusion.

17. Weekend/Holiday Expectations

The PICU utilizes a one-team rounding structure on weekends and holidays

	Primary Team ("Blue" Team)	Pediatric Cardiothoracic Surgery Team (Part of "Blue Team")
Team Leader	PICU Attending	PICU Attending Pediatric CT Attending
Primary Mid-Level	PICU APP or Fellow	PICU APP/Fellow OR Peds CT Surgery APP
Secondary Mid-Level	PICU APP or Fellow	PICU APP/Fellow OR Peds CT Surgery APP
Patient Type	Medical-Surgical Patients	Peds CT Surgery Patients
Level of Care	PICU for all medical patients, PIMCU for medical patients on pediatric critical care service, PICU or PIMCU for all surgical patients	PIMCU or PICU
Census	Varies	Varies
Rounding Start Time	8:00am	~8:30 am if no Peds CT APP present ~10:00am if Peds CT APP present
Note Writing	Residents writes notes Post-Call Resident excused from writing notes if presenting patients on morning rounds	Only PICU Attending writes notes

Note:

Every effort will be made to reduce the clerical workload that often increases on the weekend at the PICU attending's discretion.

The resident, however, will be responsible for ensuring all orders, consultations, and follow up is performed on all of the patients.

18. APPENDIX

Pre-PICU Required Knowledge Base

Although you do not rotate through the ICU in you PGY-1 year, there is a body of knowledge that provide a basis for the more advanced knowledge and skills to be acquired.

Prior to your PICU rotation, you will be expected to be able to:

- Provide adequate basic life support for the newborn, infant, child or adolescent (BLS training)
- Interpret respiratory and metabolic components of ABGs
- Recognize imminent deterioration in patients with common pediatric problems (e.g., asthma, croup, DKA, dehydration, etc.)
- Understand the pathophysiology and sequelae of electrolyte disturbances
- Recognize acute airway emergencies (e.g., croup, epiglottitis) and plan the initial management (escalation of respiratory support, racemic epinephrine, steroids, etc)
- Recognize the need for and obtain appropriate consultations from medical, surgical and ancillary services.

Rounding Presentation Instructions

Rounds:

Rounds are conducted by the team leader (PICU attending or senior fellow) starting immediately after X-Ray Rounds.

The primary purposes of rounds are:

1. Formation of a clear daily plan
2. Transfer of care from the overnight team to the day team
3. Education.

With many complex patients in the PICU, it is imperative that participants in rounds know their patients well, have effectively pre-rounded on their patients, and keep presentations clear and concise with minimal repetition.

The team walks from bedside to bedside to see each patient with some patients rounded on with the consulting services.

The bedside nurse and the family should be included on rounds and the plan should be clearly communicated.

Rounds should be “work rounds” and daily orders should be written as rounds progress.

The more acute patients and transfers to the ward will be given priority.

Oral presentations are one of the daily highlighted resident responsibilities.

- Residents demonstrate their knowledge base through the questions asked, review of various topics discussed on rounds, and the comprehensive nature of the assessment and plan presented. When you are not presenting, you may be asked to enter orders or complete the goal sheet.
- It is imperative that you pay attention on rounds. This is where the majority of teaching takes place. Likewise, it is important that everyone knows what is going on with all patients in the unit. Residents may have to accompany someone to MRI or leave post-call and YOU will be responsible for knowing what happened on rounds that day.

Interruptions:

- Your presentation may be interrupted if the information is inaccurate, there is updated clinical information, or if pertinent clinical details are omitted.
- During the management portion of the presentation, most attendings prefer that it is presented by system, with a concise but comprehensive assessment of the patient's status presented first.
    - Example: if you believe patient will be extubated today, present that as part of your assessment since this would directly affect plans in other systems
- Please be prepared to present and allow attending interjection at the end of the system presentation. This is necessary for patient quality and safety (i.e. accurate order entry) and clear communication among the healthcare team members.

Order Entry:

- If you are not presenting, you are expected to enter orders for your colleagues. The presenter is responsible for ensuring its accuracy.
- These orders will be read back at the conclusion of that patient's rounds, thus communication and accuracy is imperative to maintain rounding flow.

Goal Sheets

The goal sheets were initiated to facilitate communication and safety among all team members caring for the PICU patients. The goal sheets will be completed every day on every patient during rounds. Specific, measurable goals are preferred (ie: K>3.0, negative fluid balance by 500ml, etc.)

Presentation Workflow:

Residents are responsible for presenting their primary patients on rounds; on weekends, all resident patients should be divided among the post-call and on-call residents, and if present, the pediatric cardiothoracic surgery physician assistant.

Presentations on rounds should be as succinct as possible while incorporating data pertinent to the patient's disease state and plan formation. The general flow of presentations is as follows:

1. Rounds are nursing driven, thus the nurse will be located (routinely by ASCOM phone) before rounds start.

2. Resident will identify themselves to the nurse and family (if present) as the primary resident physician and they will present a brief one-line patient identifier (Name, reason for admission, general trajectory, and overnight events).

3. The resident will then pause and allow the nurse to complete their portion of the presentation (i.e. their view of the general trajectory, overnight events, and new pertinent clinical information, family concerns) and an overview of the nursing/medical care of the patient (i.e. central line issues or concerns, wounds, etc.)

3. Resident will present and provide a review of systems, highlighting changes over last 24 hours and pertinent physical exam findings, vital signs, and laboratory/radiographic data

4. After the presentation, the resident is expected to provide a one-line assessment of patient (not a repetition of patient identifier; but a diagnosis summary or differential diagnosis and appraisal of clinical status). **This assessment is crucial to minimize the amount of interruptions that can occur during your rounding presentation. Treatment plans often involve more than one system, thus if your assessment is inaccurate you have a high likelihood of instituting a plan that will be incorrect for more than one system

- (i.e. a common example is the patient that a resident does not recognize is ready for extubation. The neurology plan would not be to maintain or escalate sedation, the respiratory plan would not be to continue CPAP trials, the nutrition plan would not be to continue feeds).

5. Resident will provide a daily plan (complete plan by systems for complex patients; may be simplified for straight-forward patients)

6. Ensure there are no other nursing or family concerns.

7. Provide an overview of the plan, ensure all orders are reviewed and entered. The resident should be prepared to justify the treatment plan as outlined.

Family centered rounds:
When families are present, they should be invited to participate if they wish.

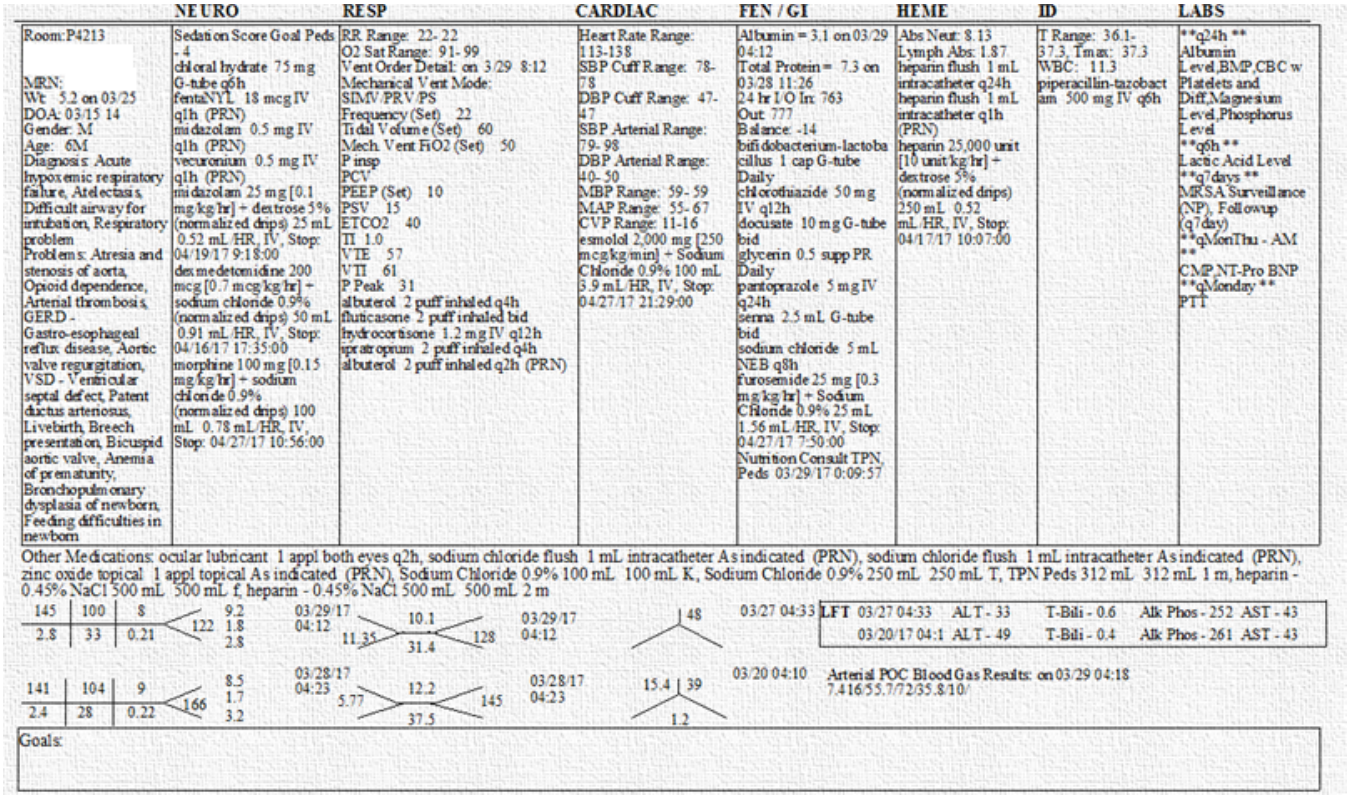
It is **not** necessary to eliminate appropriate medical terminology, but residents should be cognizant of including parents as much as possible without disrupting the flow of rounds.

Parental input should be solicited, questions answered briefly if possible, or, if lengthy, deferred until after rounds.

Rounding Sheet:
Prior to receiving sign-out from the post-call resident, please retrieve the customized pre-rounding sheet developed by our electronic health record located within this icon in the Connected window:

Discern Analytics 2

Then you will print several pre-rounding sheets as shown below:



NEURO	RESP	CARDIAC	FEN / GI	HEME	ID	LABS
Room:P4213 MRN: Wt: 5.2 on 03/25 DOA: 03/15 14 Gender: M Age: 6M Diagnosis: Acute hypoxemic respiratory failure, Atelectasis, Difficult airway for intubation, Respiratory problem Problems: Atresia and stenosis of aorta, Opioid dependence, Arterial thrombosis, GERD - Gastro-esophageal reflux disease, Aortic valve regurgitation, VSD - Ventricular septal defect, Patent ductus arteriosus, Livebirth, Breech presentation, Bicuspid aortic valve, Anemia of prematurity, Bronchopulmonary dysplasia of newborn, Feeding difficulties in newborn	Sedation Score Goal Peds - 4 chloral hydrate 75 mg G-tube q6h fentaNYL 18 mcg IV q1h (PRN) midazolam 0.5 mg IV q1h (PRN) vecuronium 0.5 mg IV q1h (PRN) midazolam 25 mg [0.1 mg/kg/hr] + dextrose 5% (normalized drips) 25 mL 0.52 mL/HR, IV, Stop: 04/19/17 9:18:00 dexmedetomidine 200 mcg [0.7 mcg/kg/hr] + sodium chloride 0.9% (normalized drips) 50 mL 0.91 mL/HR, IV, Stop: 04/16/17 17:35:00 morphine 100 mg [0.15 mg/kg/hr] + sodium chloride 0.9% (normalized drips) 100 mL 0.78 mL/HR, IV, Stop: 04/27/17 10:56:00	RR Range: 22- 22 O2 Sat Range: 91- 99 Vent Order Detail: on 3/29 8:12 Mechanical Vent Mode: SIMV/PRV/PS Frequency (Set) 22 Tidal Volume (Set) 60 Mech Vent FiO2 (Set) 50 P insp PCV PEEP (Set) 10 PSV 15 ETCO2 40 TI 1.0 VTE 57 VTI 61 P Peak 31 albuterol 2 puff inhaled q4h fluticasone 2 puff inhaled bid hydrocortisone 1.2 mg IV q12h ipratropium 2 puff inhaled q4h albuterol 2 puff inhaled q2h (PRN)	Heart Rate Range: 113-138 SBP Cuff Range: 78- 78 DBP Cuff Range: 47- 47 SBP Arterial Range: 79- 98 DBP Arterial Range: 40- 50 MBP Range: 59- 59 MAP Range: 55- 67 CVP Range: 11-16 esmolol 2,000 mg [250 mcg/kg/min] + Sodium Chloride 0.9% 100 mL 5.9 mL/HR, IV, Stop: 04/27/17 21:29:00	Albumin = 3.1 on 03/29 04:12 Total Protein = 7.3 on 03/28 11:26 24 hr I/O In: 763 Out: 777 Balance: -14 bifidobacterium-lactobacillus 1 cap G-tube Daily chlorothiazide 50 mg IV q12h docusate 10 mg G-tube bid glycerin 0.5 supp PR Daily pantoprazole 5 mg IV q24h senna 2.5 mL G-tube bid sodium chloride 5 mL NEB q8h furosemide 25 mg [0.3 mg/kg/hr] + Sodium Chloride 0.9% 25 mL 1.56 mL/HR, IV, Stop: 04/27/17 7:50:00 Nutrition Consult TPN, Peds 03/29/17 0:09:57	Abs Neut: 8.13 Lymph Abs: 1.87 heparin flush 1 mL intracatheter q24h heparin flush 1 mL intracatheter q1h (PRN) heparin 25,000 unit [10 unit/kg/hr] + dextrose 5% (normalized drips) 250 mL 0.52 mL/HR, IV, Stop: 04/17/17 10:07:00	T Range: 36.1- 37.3, Tmax: 37.3 WBC: 11.3 piperacillin-tazobactam 500 mg IV q6h	**q24h ** Albumin Level,BMP,CBC w Platelets and Diff,Magnesium Level,Phosphorus Level **q6h ** Lactic Acid Level **q7days ** MRSA Surveillance (NP), Followup (q7day) **qMonThu - AM ** CMP,NT-Pro BNP **qMonday ** PTT

Other Medications: ocular lubricant 1 appl both eyes q2h, sodium chloride flush 1 mL intracatheter As indicated (PRN), sodium chloride flush 1 mL intracatheter As indicated (PRN), zinc oxide topical 1 appl topical As indicated (PRN), Sodium Chloride 0.9% 100 mL 100 mL K, Sodium Chloride 0.9% 250 mL 250 mL T, TPN Peds 312 mL 312 mL 1 m, heparin - 0.45% NaCl 500 mL 500 mL f, heparin - 0.45% NaCl 500 mL 500 mL 2 m

145 | 100 | 8 / 2.8 | 33 | 0.21 — 122 — 9.2 / 1.8 / 2.8

03/29/17 04:12: 11.35 — 10.1 / 31.4 — 128

03/29/17 04:12: 48

03/27 04:33

LFT 03/27 04:33 ALT - 33 T-Bili - 0.6 Alk Phos - 252 AST - 43
03/20/17 04:1 ALT - 49 T-Bili - 0.4 Alk Phos - 261 AST - 43

141 | 104 | 9 / 2.4 | 28 | 0.22 — 166 — 8.5 / 1.7 / 3.2

03/28/17 04:23: 5.77 — 12.2 / 37.5 — 145

03/28/17 04:23: 15.4 | 39 / 1.2

03/20 04:10 Arterial POC Blood Gas Results: on 03/29 04:18 7.416/55.7/72/35.8/10/

Goals:

This is a typical pre-rounding sheet. Our division designed this sheet to facilitate resident workflow. While it provides a lot of useful information, it is not perfect.

A few notes about its imperfections:

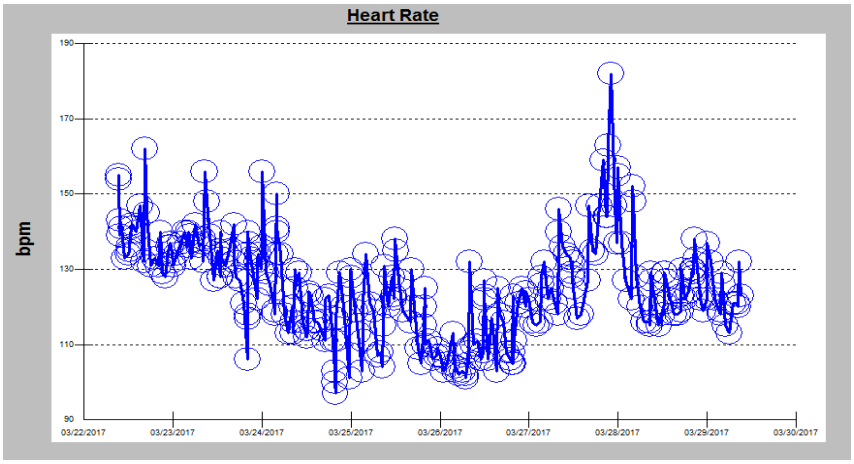
- First, the timing of the print-out is important. If you print it out before all the labs are back, you will not have the most up to date values. This also includes the entry of vital signs, fluids, etc. Therefore, review of the chart will still be essential to ensure you have the most accurate data.

- The data provided is limited by the space provided. Thus, you will lack the number of times a patient received sedation, the amount of urine output per hour a patient has been voiding, the number of transfusions a patient received overnight, the day number of antibiotics, the day number of central line placement, only one blood gas, the most up to date microbiology, how well or poorly a patient did on a CPAP trial, and certain drug levels (i.e. Theophylline levels, Corrected Phenytoin levels). Therefore, the resident, while pre-rounding must know their patient and be able to use this sheet as a starting point for the data collection of their patient.

Word on Vital Signs:

Key Point: The PICU team wants to know the trend

- Is the patient hemodynamically stable or not?
- Are they becoming more tachycardic?
- Are they hypotensive for age?
- Use graphs to help you visualize.

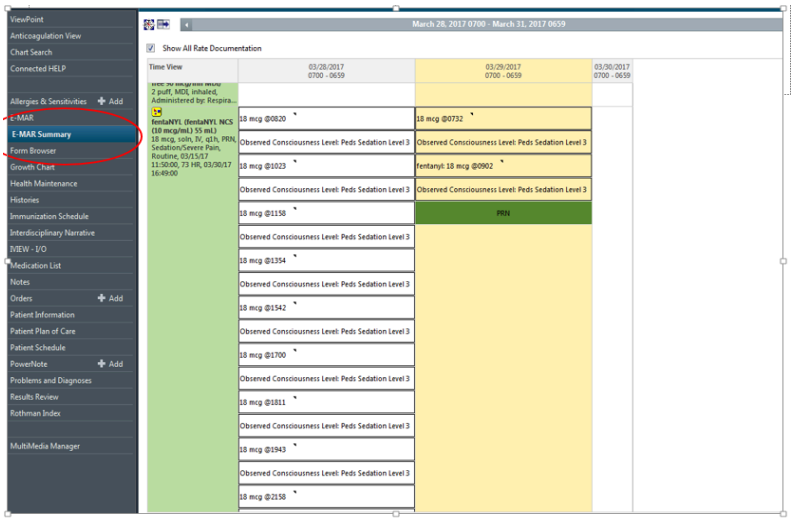


- Learn which medication is titratable and can change minute to minute
  - Norepinephrine, Nitroprusside, Nicardipine
  - Can look at the IV pumps in the room, ask the RN, or you can look in the I/O View

Word on Neurologic System:

Essential Items:

1. Number of PRN Sedatives and Paralytics – Must count or utilize iAware.



2. Drug Levels (Phenobarbital, Phenytoin Level, etc)

Note: Phenobarbital does show up on the sheet, but the pitfall is knowing when the level was drawn (i.e. at 8am).

Note: Phenytoin levels need to be corrected for Albumin (calculator available in Cerner)

Word on Respiratory System:

Essential Items

1. Current Ventilator Settings and any changes overnight
2. Peak Inspiratory Pressures if on PRVC, Tidal Volumes if on PC, etc.
3. Secretions (consistency, frequency of suctioning needs) if ventilated (this information is often best obtained from the bedside nurse)
4. CPAP trial data (number and length of trials, level of support, respiratory rate and volumes during trial, post-CPAP blood gas (if applicable)).
5. SPO2 saturations, PaO2s
6. Day of Corticosteroids
7. Theophylline Level

Daily Goal Sheet Utilized By PICU

Patient Sticker

Date/RN Initials: _____

Daily Goals

Physician/APP Initials: _____

RN # 31_____ **Attending** # 311146 **Fellow** # 311151 **Resident** # 310102

Nurse Practitioner # 310104 **PA** # 310105 **CT PA** # 311144 **Primary Resident**: _____

AM Rounds	**PM Rounds**
Restraints: ☐ Yes ☐ No **Active Order:** ☐ Yes ☐ No **Restraints renewed**: ☐ Yes ☐ No	☐ No Changes ☐ Changes
CNS Sedation Level: 2 3 4 5 6 Pain/Sedation Control: ☐ Wean ☐ Increase ☐ No Changes Goal ICP: _____ Temp Goal: _____ Blood Culture: ☐ Yes ☐ No Additional Tests: ☐ CT ☐ MRI ☐ EEG	☐ No Changes ☐ Changes
Respiratory pH_____ O_2 Saturation _____ PaO_2_____ CO_2 _____ ☐ Wean O_2: ☐ Yes ☐ No ☐ Vent changes: _____ ☐ CPAP ☐ Extubate ☐ ETT cuff leak: ☐ Yes ☐ No ☐ Other: _____	☐ No Changes ☐ Changes **Candidate for Extubation Readiness Trial**: ☐ Yes ☐ No
Cardiovascular MAP_____ SBP_____ DBP_____ Arterial Catheter: ☐ Sutures/Drsg intact Additional Tests: ☐EKG ☐ Echocardiogram	☐ No Changes ☐ Changes
Fluids / Electrolytes Total Fluids: _____ ml/hr Fluid Balance: ☐ Positive (I>O) ☐ Even ☐ Negative (I<0) Labs: Na+_____ K+_____ Mg+_____ Ica++_____ Glucose ☐ 80-180 Glucose Other _____	☐ No Changes ☐ Changes
Gastrointestinal / Nutrition Diet: ☐ NPO ☐ Trophic ☐ Advance Feeds ☐ Ad Lib ☐ TPN ☐ Ulcer Prophylaxis ☐ Change IV Medications to Enteral	☐ No Changes ☐ Changes
Hematologic Hgb_____ Hct_____ Plt_____ INR_____ PT_____ PTT_____ Fibrinogen_____ α10Xa_____	☐ No changes ☐ Changes
ID CVAD Necessary: ☐ Yes ☐ No ☐ NA ☐ Sutures/Drsg intact Foley Necessary: ☐ Yes ☐ No ☐ NA Isolation Precautions: ☐ Standard ☐ Contact ☐ Droplet ☐ Contact & Droplet ☐ Airborne Cultures Reviewed: ☐ Antibiotic Level Goals_____	☐ No Changes ☐ Changes
Misc: Medications and Orders Reviewed: ☐ Yes ☐ No Cxr/Labs/Lab Schedules reviewed: ☐ Yes ☐ No Consults/Type: _____ ☐ Called ☐ Completed Family Care Meeting: ☐ Discussed ☐ Offered ☐ Requested	☐ No Changes ☐ Changes

Overview of Nasojejunal (NJ) Tubes

This is a brief overview of NJ Tube Placement, provided as an easy reference for residents.

There is an online COMPASS training course that we do ask the residents to complete as nasojejunal tubes are utilized frequently in the PICU. It is entitled “Nasojejunal Tube Placement.”

INTRODUCTION:

There are 2 kinds of NJ tubes:

- Weighted
- Non-weighted

In critically ill patients, transpyloric or nasojejunal (NJ) feeding is preferred over nasogastric (NG) feeding since studies conclude that NJ feeding is associated with:

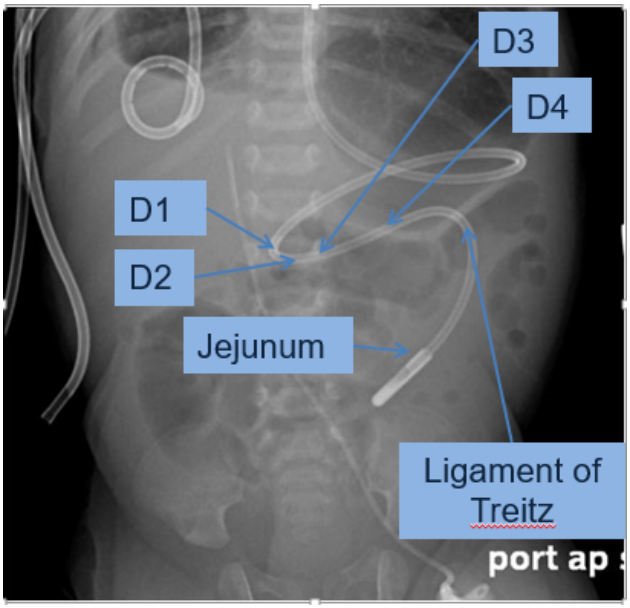
- An earlier onset and improved tolerance of enteral nutrition
- Less frequent gastrointestinal complications
- Shorter time to achieve goal caloric requirements

THE CORRECT NJ POSITION:

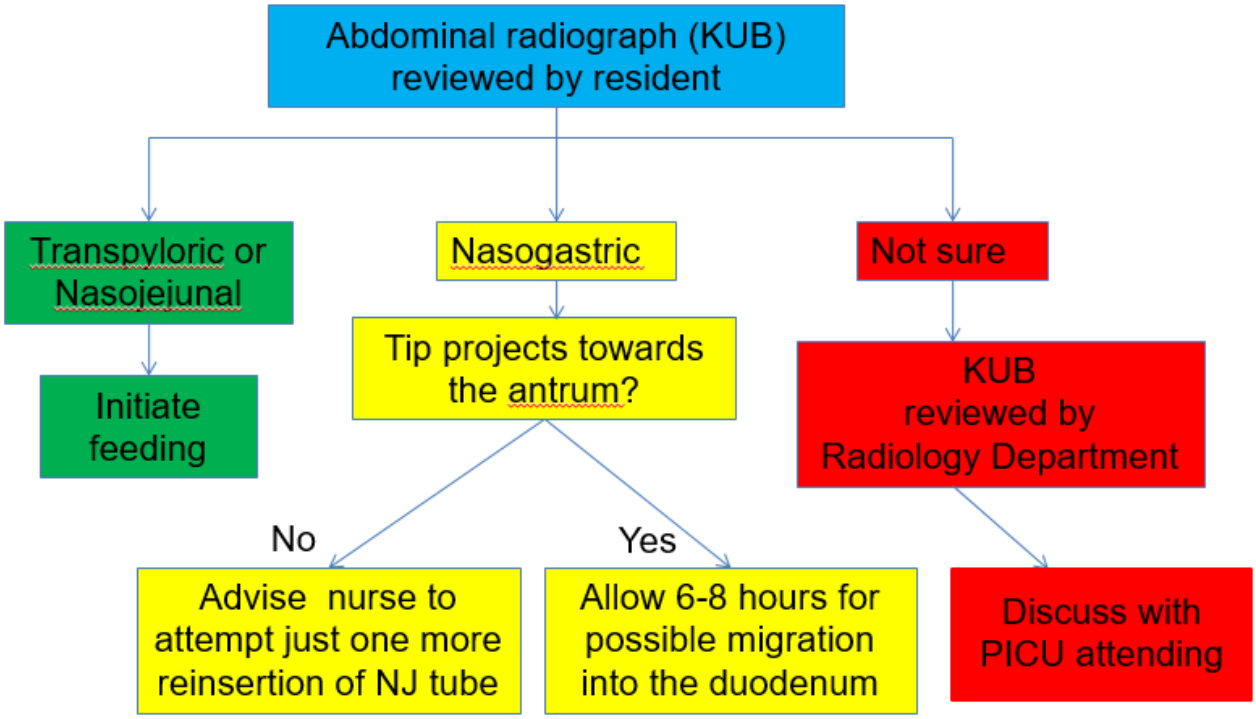
The pathway of a correctly positioned nasojejunal tube begins through the nose, into the pharynx, down the esophagus, entering the stomach, crossing the midline (which usually indicates that the tube has gone through the pylorus), and out into the duodenum.

There are 4 segments of the duodenum. The duodenal bulb is considered the first portion (D1), and is directed posteriorly. The second (D2) or descending portion is lateral to the pancreatic head. The third portion (D3) is the horizontal portion. The fourth portion (D4) or ascending portion ascends to the ligament of Treitz. The ligament of Treitz is where it turns abruptly to form the duodenal-jejunal flexure.

The NJ tube may pass completely through the duodenum, beyond the ligament of Treitz, and into the jejunum.

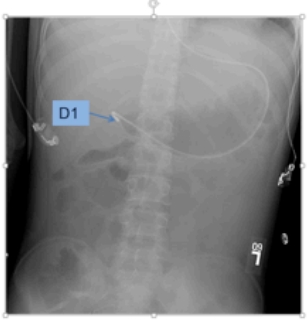


Penn State Hershey PICU Algorithm for Verifying NJ placement

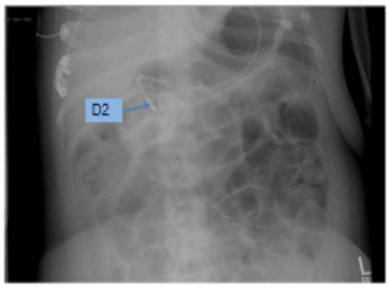


Examples of NJ Tubes Terminating in the Duodenum:

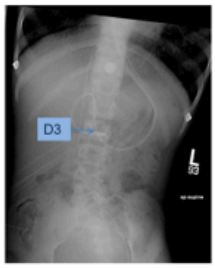
NJ Tip at the first portion of the duodenum



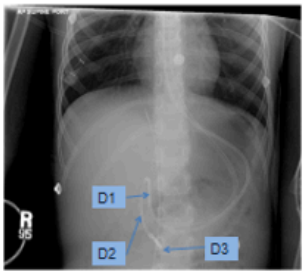
NJ Tip at the second part of the duodenum



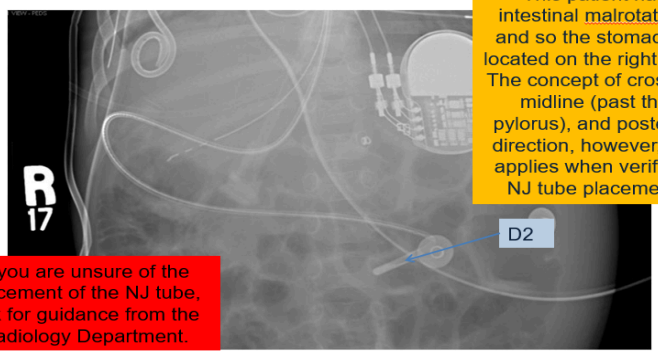
NJ tip at the third part of the duodenum



NJ Tip at the junction of the 2nd and 3rd part of duodenum



NJ tip at the junction of second and third part of duodenum



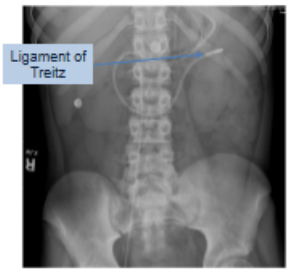
This patient has intestinal malrotation, and so the stomach is located on the right side. The concept of crossing midline (past the pylorus), and posterior direction, however, still applies when verifying NJ tube placement.

If you are unsure of the placement of the NJ tube, ask for guidance from the Radiology Department.

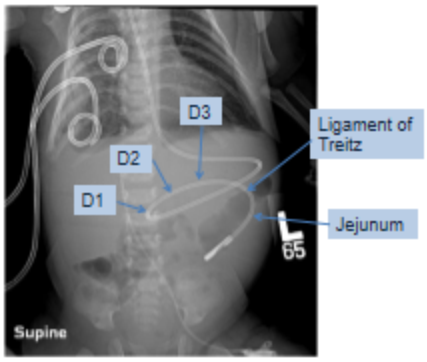
NJ Tubes Terminating at the Ligament of Treitz or Jejunum

The Ligament of Treitz is a small muscle band wrapped around the duodeno-jejunal junction, and is an anatomical landmark.

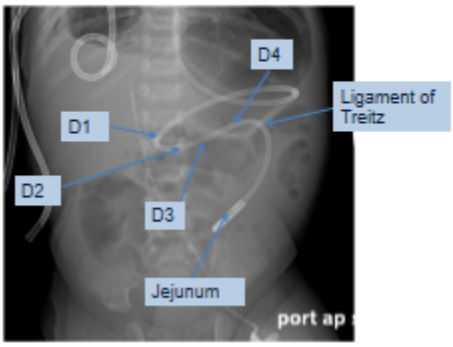
NJ tip at the duodenojejunal junction (Ligament of Treitz)



NJ tip in proximal jejunum

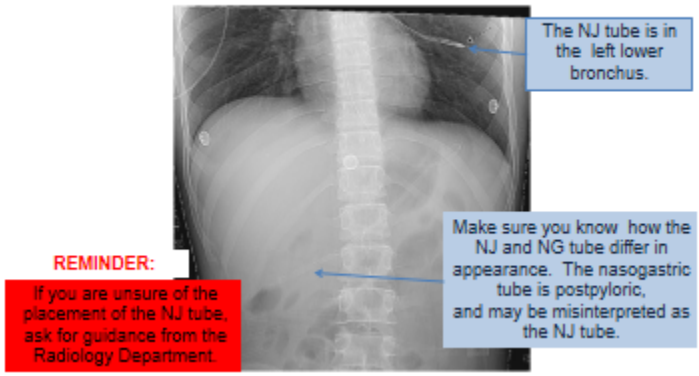


NJ tip in proximal jejunum

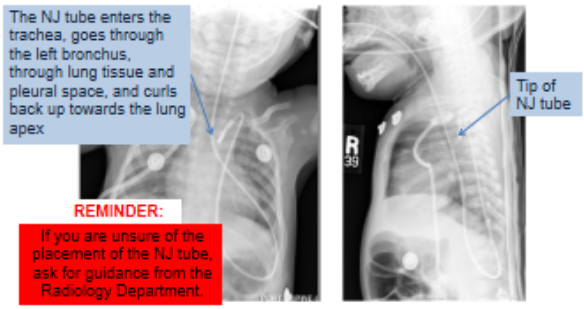


NJ Tubes that are not "in"!

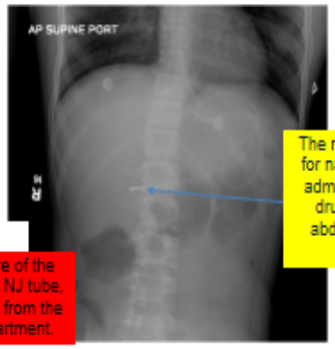
NJ tip in the lower bronchus!



NJ Tube in the chest!



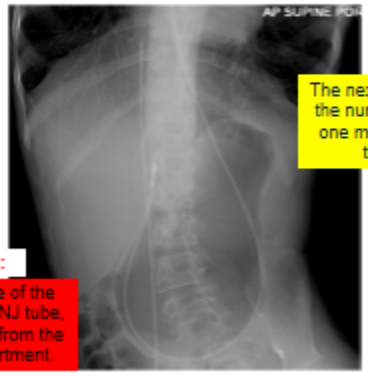
NJ Tip at the gastric antrum



The next step is to allow for natural migration, or administer a prokinetic drug, and obtain an abdominal film in 6-8 hours.

REMINDER:
If you are unsure of the placement of the NJ tube, ask for guidance from the Radiology Department.

NJ tip in the stomach



The next step is to advise the nurse to attempt just one more reinsertion of the NJ tube.

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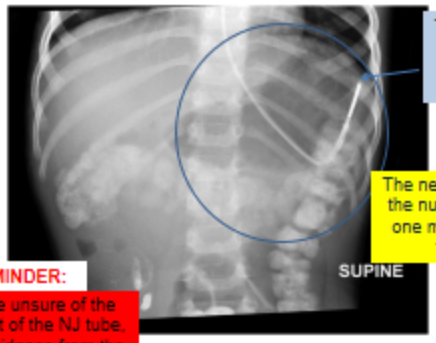
NJ tip in the stomach



The NJ tube tip is directed towards the fundus of the stomach.

The next step is to advise the nurse to attempt just one more reinsertion of the NJ tube.

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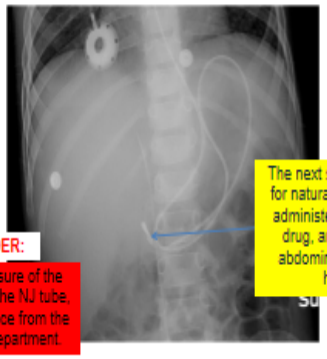
NJ tip near the pylorus



The next step is to allow for natural migration, or administer a prokinetic drug, and obtain an abdominal film in 6-8 hours.

REMINDER:
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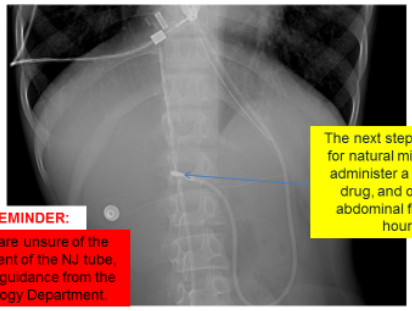
NJ tip in the stomach



The next step is to allow for natural migration, or administer a prokinetic drug, and obtain an abdominal film in 6-8 hours.

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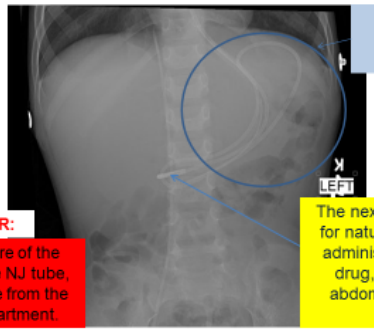
NJ tip near the pylorus



The NJ tube is looped in the stomach.

The next step is to allow for natural migration, or administer a prokinetic drug, and obtain an abdominal film in 6-8 hours.

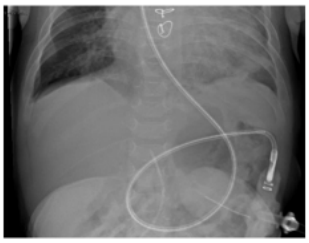
REMINDER:
If you are unsure of the placement of the NJ tube, ask for guidance from the Radiology Department.

Not Sure?

REMINDER:
If you are unsure of the placement of the NJ tube, ask for guidance from the Radiology Department.

Solution: Obtain a cross-table lateral film to confirm that the NJ tube is directed posteriorly into the duodenum.

Not Sure?



REMINDER:
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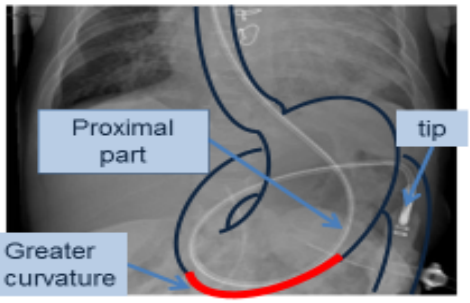
The cross-table lateral film shows that the tube has gone posteriorly , and the tip terminates at the Ligament of Treitz.

Not Sure?



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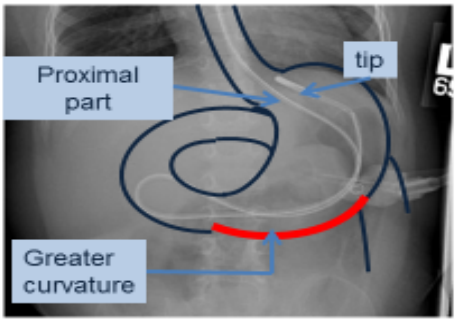


In contrast, if the tube follows the same pathway as the proximal portion, and is situated in close proximity to the proximal portion of the NJ tube, then the tube is likely in the stomach.

PICU Sedation/Analgesia

LEVELS OF SEDATION

All Ventilated Children

Level	Goal	Action
Level 1	Awake and **interactive** with environment, watches TV, communicates (generally for more mature children with neuromuscular cause for ventilation).	PRN anxiolytics/analgesics
Level 2	Sleepy, **arouses to light stimulation**, becomes excited with nursing care/suctioning, moves spontaneously, turns head, **consistently breathes above ventilator.**	PRN anxiolytics/analgesics, continuous anxiolytics/analgesics and/or paralytics only for extreme agitation/movement.
Level 3	Asleep most of time, **arouses to pain**, coughs with suctioning, breathes above ventilator, **little spontaneous movement or head turning.**	PRN anxiolytics/analgesics with or without continuous anxiolytics/analgesics, paralytics only if PRN sedatives fail.
Level 4	Asleep, arouses to pain, coughs with suctioning, **returns to sleep immediately, does not consistently breath above ventilator**, little	Continuous anxiolytics/analgesics, PRN anxiolytics/analgesics, paralytics only if PRN sedatives fail.

	spontaneous movement, **no head turning.**	
Level 5	Asleep, minimal response to pain or suctioning, **no respiratory effort, no sustained spontaneous movements.**	Continuous anxiolytics/analgesics, PRN anxiolytics/analgesics, liberal use of paralytics if PRN sedatives fail.
Level 6	Asleep, **continuous paralysis**, level of paralysis assessed by nerve stimulator or by observing minor motor movements between supplemental doses.	Continuous anxiolytics/analgesics, continuous paralytics, PRN anxiolytics/analgesics titrated to vital signs.

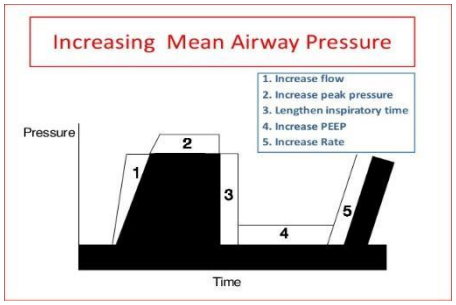
Mechanical Ventilation

Key Concepts:

1. **Compliance** = change in volume/change in pressure. If you are ventilating a patient using volume control, a change in peak pressure may indicate a change in lung compliance (ex. An increasing peak pressure may mean worsening lung compliance). In the same manner, if you are using pressure control, a change in the measured tidal volume may indicate a change in lung compliance.
2. **Tidal volume** = Physiologic tidal volume: 6-8 ml/kg. However, ventilator strategies for tidal volume may differ based on disease process and the clinician.
3. **Minute ventilation** = RR x tidal volume. Minute ventilation affects pCO2 levels (translation If you want to decrease the pCO2, you may need to increase your RR or tidal volume.
   NOTE: Whenever you increase the RR/TV, watch out for air-trapping.
   - Ventilation is not optimal when there is air trapping.
   - Air trapping is typically seen in patients with obstructive lung disease (ex. asthma). It occurs when the patient has not completely exhaled, and another breath is delivered.
   - Normally, there should be no airflow occuring at the end of expiration (Vee = 0 noted on ventilatior).

- During air trapping, a breath is delivered even though the end-expiratory flow, or Vee has not returned to baseline (Vee > 0).
- The solution for air trapping is to decrease, rather than increase the respiratory rate.

4. **Dead Space** – is the portion of each TV that remains in the non-exchanging portions of the airway, AKA: areas where no ventilation occurs. The anatomic dead space is reflected by the difference between the end-tidal CO2 and PaCO2 levels.
5. **Mean Airway Pressure** - the average airway pressure during a respiratory cycle. Increasing the MAP will increase oxygenation (i.e., increasing your PEEP and Inspiratory time on the ventilator will increase the patient's oxygenation).



$$M_{PAW} = \frac{f \times T_i}{60} \times (P_{IP} - PEEP) + PEEP$$

6. **PEEP** is the pressure in the lungs (alveolar pressure) above atmospheric pressure (the pressure outside of the body) that exists at the end of expiration.
    a. Physiologic PEEP 3-5cm H20
    b. Increasing PEEP increases MAP and augments oxygenation
    c. Higher PEEP settings may decrease venous return and result in unstable hemodynamics

Other Formulas that may be measured and routinely assessed for patients with primary respiratory issues:

A. P/F Ratio: PaO2/FiO2.
B. Oxygenation Index : FiO2/PaO2 x MAP
C. Oxygen delivery = cardiac output x arterial oxygen content or CaO2
D. CaO2 = 1.34 x Hgb x SaO2 + 0.003 (PaO2)

Typical Ventilation Strategies Used in Our PICU:

Disease Process	Strategy	Key settings	Goals
1. Asthma	Permissive hypercapnia for adequate oxygenation	PRVC-SIMV mode, Low RR, Increased E time	pH >7.2-7.3

2. ARDS	Protective lung strategy, Monitor P/F and OI , Limit plateau P	PRVC-SIMV mode, High PEEP, Low tidal volumes (6ml/kg)	pH >7.35
3. Traumatic Brain Injury with increased intracranial pressure	Mild-moderate hyperventilation	PRVC-SIMV mode, Adequate TV and RR	pH 7.4-7.45 PaO2 >100
4. Post-op Norwood Stage 1	Optimize CO, Low mean airway pressure, Balanced Qp:Qs	VC mode, Adequate* TV, iCO2	pH 7.35-7.4 PaO2 ~40
5. Normal lungs (ex. Status epilepticus in BSC)	Supportive oxygenation/ ventilation	PRVC-SIMV, Adequate TV, RR, PEEP	pH 7.35-7.45
6. Chronic lung disease	Transition to home ventilation	PC mode, Adequate TV, RR, PEEP	pH 7.35-7.45

Tips:

- Always reassess the patient's lung compliance. You may have to reset your goals as the compliance changes.
- Initial peak pressures <20 should cause concern that Vt is inadequate.
- PIP >30 raises concern that Vt too large, tube is in the Right main stem bronchus or lung disease is quite significant.

CPAP Trials

- CPAP trials are performed to assess the patient's readiness for extubation. When ordering CPAP trials, please set the FiO2, pressure support, duration and frequency. During the CPAP trial, the nurse will record the following values: RR, TV, end tidal CO2 and O2 Sat. These values, along with an arterial/venous blood gas, will help you assess if the patient "passed" the CPAP trial or not.

Invasive Positive Pressure Ventilation= forced inhalation with passive exhalation.

1. When the vent breathes for the patient: "SIMV" or "AC"
    a. Synchronized intermittent mechanical ventilation (SIMV)
        i. Set a mandatory rate and the patient can breathe above it with support (PS)
        ii. If taking a breath near time for a mandatory breath, the machine gives the mandatory breath with full PC or VC in synch with the patient's effort.
    b. Assist control (AC): get full pressure control with every spontaneous AND mandatory breath, to be used in only certain circumstances (e.g. SMA Type I, or paralysis)
2. How the ventilator delivers the breath: With a set pressure or set volume?
    a. Pressure control (PC): Delivers a set pressure above the PEEP, "decelerating flow pattern" just like blowing up a balloon.
    b. Volume control (VC): Delivers a set volume using a set flow.
    c. Pressure-regulated volume control (PRVC):
        i. actually a pressure control mode with a smarter ventilator.

ii. Set a goal Vt and the ventilator tests the compliance of the lung to determine what pressure is needed to deliver that tidal volume
iii. This mode can adjust to dynamic compliance changes in the lung.

d. CPAP+PS: Set the PEEP ("CPAP") above which the patient spontaneously breathes ("triggers the ventilator to breathe") with PS to overcome ET tube resistance.

Vent Parameter	Definition	Starting Setting
Tidal Volume (V_t)	Volume given with each mandatory breath	6-10ml/kg, if very stiff lungs (poor compliance) aim lower = 4-6ml/kg
Pressure control (PC)	Inspiratory pressure over PEEP, not the same as Peak Inspiratory Pressure (PIP=PC+PEEP)	Usually around 14-20cmH_2O, look for good chest rise and V_t
Pressure support (PS)	Support given by the vent for each spontaneous breath	Usually 10cmH_2O for ETT, lower for tracheostomy
Positive end-expiratory pressure (PEEP)	Pressure left in the circuit at the end of each breath, used to maintain FRC	5cmH_2O for normal lungs, higher in atelectasis. If >10, paralysis is recommended to avoid a PTX.
Respiratory Rate	# of mandatory breaths/min	Age appropriate
Inspiratory time (I_t)	Amount of time over which the vent will deliver the set V_t or PC ****Remember I_t determines E_t.**	Newborn to 1yo: 0.50 – 0.70 s >1 yo: 0.60 – 1 second. **E_t= (60/RR) - I_t****
F_iO_2	Fraction of inspired air that is O_2	Titrate as soon as possible to <60%
Peak inspiratory pressure (PIP)	PEEP + PC, not set-just observed	Goal < 30 or lower cmH_2O to avoid barotrauma