Overview
The overarching goal of the Pediatric Sub-internship is that, upon successful completion of the rotation, students will be ready to function at the level of a first-week pediatric intern. Over the course of the rotation, students will become familiar with the six ACGME competencies. This course places particular emphasis on Practice-Based Learning and Improvement, including reflective practice and self-directed learning.

Goals
1. Upon successful completion of the sub-internship, students will be ready to function at the level of a first-week pediatric intern.
2. Throughout the rotation, students will build skills in self-directed learning. Students will:
   a. Use specific patient encounters and/or team experiences to identify learning goals
   b. Critically assess attributes and weaknesses and identify areas for improvement
   c. Create a dynamic individualized learning plan that includes specific action plans for each goal
   d. Demonstrate awareness and understanding of the six ACGME competencies (see Appendices A & B)
   e. Learn how to obtain constructive feedback from observers

Introduction
Inpatient ward rotations are at the core of general pediatric training. At LPCHS, the focus is on the care of acutely and chronically ill children with a high degree of complexity and acuity. You will be assigned to one of three ward teams:
- Green Team: Gastroenterology; supervised by senior resident
- Red Team: Nephrology and Rheumatology; supervised by senior resident
- Yellow Team: Pulmonary and Endocrinology; supervised by junior resident

See Appendix C for expectations for supervising residents.

Orientation & Arrival Information
Sub-interns should arrive for Monday morning handoff at 6:00 am. Your intern or supervising resident will email you with the location of the handoff; alternatively, you can page them at peds.stanford.edu upon your arrival. You will observe handoff, and then shadow your intern or junior resident as they pre-round on at least three patients. After that, you may choose to spend time familiarizing yourself with the electronic medical record system (Epic) and patient
histories. At 8:00 am you will attend Morning Report in the LPCHS Board Room, just to the right of the main hospital entrance on the first floor of LPCHS.

You will observe on rounds in the morning and shadow your team members as they complete morning work. You may begin to take over some patient care responsibilities, starting with 1-3 patients. The team interns or junior resident should remain the primary caregivers for all team patients on Day 1, to allow appropriate coverage as you are gaining familiarity with the wards. You will be off the wards for about 1.5 hours in the afternoon for orientation, so you should not be assigned responsibility for primary caregiver duties on your first day (including PM handoff, which you will observe; please remind your residents).

At noon, you will go to the Board Room with your team, grab lunch, and bring it to the Residency Program Office by 12:15 pm for an orientation meeting with Dr. Everhart.

In the afternoon, in addition to contributing to work on the wards, please ask your supervising resident to discuss with you their expectations for presentations, pre-rounding, notes, etc. At 5:00 pm you will observe the interns or junior resident handoff to the night float intern.

**Individualized Learning Plan (ILP)**
Sub-interns will initiate an Individualized Learning Plan (ILP) by the end of Week 1. Learning goals and objectives established at the start of the rotation will be discussed and reviewed throughout the rotation. See below for additional details.

**Rounds**
The supervising resident (junior or senior) will manage daily patient- and family-centered rounds, during which the team will visit each unit and discuss care with patients, families, and nursing staff. It is expected that the sub-intern will communicate the assessment and plan to the patient/family on rounds and answers their questions during or after rounds. Communication with the patient, family and referring physician is very important to the care of our patients. Rounds are most often performed as “work rounds,” with real-time computerized physician order entry. Daily discharges on and after rounds should be given priority, with the goal that discharge orders should be written by 11:00 am.

**Voalte Phones and Pagers**
Providers at LPCHS use Voalte phones to call one another and send secure text messages. There are two generic role log-ins available for sub-interns to use:

<table>
<thead>
<tr>
<th>Sub-intern Voalte Role 1</th>
<th>Sub-intern Voalte Role 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Name: pcumedstu3</td>
<td>User Name: pcumedstu4</td>
</tr>
<tr>
<td>Password: 11111</td>
<td>Password: 11111</td>
</tr>
</tbody>
</table>

The sub-intern should distribute his/her pager number to members of the team. The sub-intern can also write his/her pager number next to his/her patients’ names on unit white boards in order to encourage nurses and other staff members to contact the sub-intern first with patient-related questions. The sub-intern is expected to discuss all patient care decisions with the supervising resident with he/she is paged, texted, or called about an issue. The primary team pager should be carried by the team intern (or junior resident, in the case of Yellow Team).

*Last updated 6.28.17 by J. Everhart*
Sub-intern Roles and Responsibilities

- Carry a patient load approximately equivalent to that of an intern, averaging 3-6 patients
  * These patients will generally also be followed closely by the intern for their learning, though you should present on rounds, perform handoff, and serve as the primary provider/communicator.

- Perform the primary patient care role, equivalent to the interns

- Perform histories and physicals on new patients, including a 10-14 point ROS

- Pre-round on patients and write daily progress notes
  * Ask your supervising resident for feedback on your notes. Because a daily MD-generated noted is needed for billing purposes, your supervising resident will also draft a daily progress note to forward to the attending for co-signature and billing

- Present patients on rounds
  * Remember to elicit patients’/families’ concerns and sense of illness severity [I], provide an updated general assessment in addition to more detailed discussion of each system/problem [P], generate and prioritize a daily “to do” list [A], discuss situational awareness/contingency plans [S], confirm patients’/families’ understanding of the plan [S], and seek input from nursing and ancillary staff

- Take care of daily work associated with patient care, including order entry
  * Orders will be cosigned by your supervising resident; see Appendix E for TPN info

- Communicate with patients, families and primary care providers

- Update Epic sign-out

- Handoff your patients to the night float intern
  * Use the I-PASS framework: Illness Severity, Patient Summary, Action List, Situation Awareness & Contingency Planning, Synthesis by Receiver (see Appendix D)

- Coordinate and complete patient discharges, including discharge summaries

- Complete 1 wk of Night Float according to the schedule given at the beginning of the rotation
  * Any switches with fellow sub-interns must be approved by Dr. Everhart or Dr. Stuart

Night Float
Sub-interns complete one week of Night Float according to the schedule given at the beginning of the rotation (Sunday night through Thursday night, ending Friday morning; hours for each shift are 5:00 pm – 7:00 am). There are no weekend duties on the rotation, other than 5:00 pm arrival on the first day of night float. While on Night Float, you may participate in admissions and patient care for patients on other teams, at the discretion of your supervising residents. Please sleep at home during the day; there is no dedicated medical student call room at LPCHS.

Weekly Schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:00 am</td>
<td>AM Handoff, followed by pre-rounding...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>8:00 – 8:30 am</td>
<td>...Morning Report...</td>
<td></td>
<td></td>
<td></td>
<td>Grand Rounds 8-9 am</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>8:30 – 12:00 pm</td>
<td>...Rounds &amp; Patient Care...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>12:00 – 1:00 pm</td>
<td>...Noon Conference + Lunch...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>1:00 – 5:00 pm</td>
<td>...more Patient Care + Learning...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>5:00 pm</td>
<td>...PM Handoff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Off</td>
<td>Off</td>
</tr>
</tbody>
</table>

Last updated 6.28.17 by J. Everhart
Self-Directed Learning and Associated Assignments

In order to maximize learning opportunities and personal/professional growth during the rotation, sub-interns are asked to please complete the following self-directed learning assignments:

<table>
<thead>
<tr>
<th>Week</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Initial Individualized Learning Plan (ILP) (online survey)</td>
</tr>
<tr>
<td>2</td>
<td>StrengthsFinder 2.0 (online assessment)</td>
</tr>
<tr>
<td>3</td>
<td>ILP Update (online survey)</td>
</tr>
</tbody>
</table>
| 4    | By the end of week 4:  
  - Patient feedback form (1)  
  - Structured Clinical Observation (“SCO”) (2)  

Upon course completion:  
- Reflective essay  
- Course Evaluation

Individualized Learning Plan (ILP):  
During week one of your pediatric sub-internship, reflect on specific patient encounters and team experiences to create individualized learning goal(s), with strategies for achieving goal(s) and evidence of goal achievement. Obtain feedback on goal(s) from team members throughout the rotation. Revise ILP and submit ILP and feedback documentation weekly.

Qualtrics links for ILP forms: (also available at http://med.stanford.edu/pediatricsclerkship/subinternship.html)

- Initial ILP (week 1):  
  https://stanfordmedicine.qualtrics.com/SE/?SID=SV_89cnvd1KVuVgHi ILP  
- Update (week 3):  
  https://stanfordmedicine.qualtrics.com/SE/?SID=SV_ey5d0fl7PQt2O7b

StrengthsFinder 2.0:  
- Please complete online and reflect on your “strengths” and whether they relate to your work on your team.  
- Forward results to Dr. Everhart to review during your mid-rotation check-in.

Patient Feedback Form:  
- Give form to a patient or parent. Spanish and English versions provided. Retrieve form from patient/parent yourself, or ask a member of your team.  
- Scan/email or fax form to Dr. Stuart, cc’ing Dr. Everhart

Structured Clinical Observation (SCO) Forms:  
- Please submit two observation forms by the end of the rotation, signed by a resident or faculty observer. Observations of a portion of your complete H&P will suffice. Choose Pediatric History and/or Pediatric Physical Exam.  
- Scan/email or fax forms to Dr. Stuart, cc’ing Dr. Everhart

Last updated 6.28.17 by J. Everhart
Reflective Writing Assignment / End of Sub-internship Essay:

Please submit a brief (<1 page) written reflection. Think about the transition from student to intern, and how it feels to be in the new role of patient care “manager.” Address your experiences during the sub-internship with any of the following:

- **Individualized Learning Plan**
  - Using patient care experiences to create learning goals
  - Using team experiences/feedback to create learning goals
  - The experience of deliberately creating, revising, following an ILP

- **Core Competencies**
- **Specific patient care experiences that relate to the following competencies:**
  - Interpersonal communication skills
  - Professionalism
  - Practice-based learning and Improvement
  - Systems-based practice

- **StrengthsFinder 2.0**
  - The experience of reflecting on personal strengths during this rotation

- **Feedback**
  - The experience of actively gathering specific feedback
  - Incorporating feedback and changing practice

☐ Scan/email or fax forms to Dr. Stuart, cc’ing Dr. Everhart

Feedback and Evaluation

Sub-interns should actively solicit feedback from residents, fellows, and attendings on a regular basis, multiple times a week. In addition, sub-interns may elicit feedback from patients, families, and other care team members. Sub-interns should use the feedback tools included in the binder to facilitate feedback discussions. Sub-interns should share ILP goals with team members and ask for specific feedback on these goals.

Evaluation will follow the standard Stanford School of Medicine evaluation format, assessing performance in the following areas: History and Physical, Clinical Decision-making, Fund of Knowledge, Compassion/Humanism, and Professionalism. The Coordinator or Director will contact you to ask for names of faculty and residents with whom you have worked. This is a PASS / No PASS course.

Sub-interns will meet with Dr. Everhart mid-rotation and at the end of the rotation to check-in, review progress towards personal rotation goals, and reflect on StrengthsFinder 2.0 results.

Contacts

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jeverhar@stanford.edu
Cell/Text: 714-726-0760
Pager: 650-497-8000, pager 13742
Fax: 650-736-6690

_Last updated 6.28.17 by J. Everhart_
### Appendix A: Common Residency Program Requirements: ACGME General Competencies*

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PATIENT CARE</strong></td>
<td>Be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and for health promotion.</td>
</tr>
<tr>
<td><strong>MEDICAL KNOWLEDGE</strong></td>
<td>Demonstrate knowledge of established and evolving biomedical, clinical, epidemiological, and social-behavioral sciences, as well as the application of this knowledge to patient care.</td>
</tr>
</tbody>
</table>
| **INTERPERSONAL AND COMMUNICATION SKILLS** | Demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, families, and health professionals.  
- communicate effectively with patients, families, and the public, as appropriate, across a broad range of socioeconomic and cultural backgrounds  
- communicate effectively with physicians, other health professionals, and health related agencies;  
- work effectively as a member or leader of a health care team or other professional group;  
- act in a consultative role to other physicians and health professionals;  
- maintain comprehensive, timely, and legible medical records, if applicable. |
| **PROFESSIONALISM** | Demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles. Demonstrate:  
- compassion, integrity, and respect for others  
- responsiveness to patient needs that supersedes self-interest  
- respect for patient privacy and autonomy  
- accountability to patients, society and the profession  
- sensitivity and responsiveness to a diverse patient population, including but not limited to diversity in gender, age, culture, race, religion, disabilities, and sexual orientation |
| **PRACTICE-BASED LEARNING AND IMPROVEMENT** | Demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life-long learning.  
- identify strengths, deficiencies, and limits in one’s knowledge and expertise;  
- set learning and improvement goals;  
- identify and perform appropriate learning activities;  
- systematically analyze practice using quality improvement methods, and implement changes with the goal of practice improvement;  
- incorporate formative evaluation feedback into daily practice;  
- locate, appraise, and assimilate evidence from scientific studies related to patients’ health problems;  
- use information technology to optimize learning; and,  
- participate in the education of patients, families, students, residents and other health professionals. |
| **SYSTEMS-BASED PRACTICE** | Demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care.  
- work effectively in various clinically relevant health care delivery settings and systems;  
- coordinate patient care within the health care system relevant to their clinical specialty;  
- incorporate considerations of cost awareness & risk-benefit analysis in patient and/or population-based care as appropriate;  
- advocate for quality patient care and optimal patient care systems;  
- work in interprofessional teams to enhance patient safety and improve patient care quality;  
- participate in identifying system errors and implementing potential systems solutions. |

*Approved by the ACGME Board February 13, 2007

Last updated 6.28.17 by J. Everhart
Appendix B: ACGME Competencies: A Pediatric Perspective (courtesy of COMSEP)

1. Patient Care:
   • Perform
     o Complete yet focused histories
     o Developmentally and age appropriate physical examinations
   • Promptly and accurately assess and reassess patients
   • Formulate differential diagnoses and problem lists
   • Develop and implement management plans
   • Interpret test results
   • Anticipate illness progression and expected outcomes
   • Coordinate timely and complete patient discharges

2. Medical Knowledge:
   • Pediatric illness pathophysiology
   • Medical literature and scientific evidence evaluation with appropriate application

3. Communication Skills:
   • Oral presentations, written documentation, and transfer of care
   • Appropriate/effective interpersonal skills
   • Elicit the patient’s and family’s perspective, respect cultural context

4. Professionalism:
   • Personal accountability to patients, colleagues and staff
   • Demonstrate cultural sensitivity, compassion, and respect
   • Follow guidelines re: attire, language, documentation, and confidentiality
   • Effective interpersonal interactions that maintain professional boundaries
   • Recognize the impact of stress, fatigue, illness, and personality differences

5. Practice Based Learning and Improvement:
   • Practice self-directed learning
   • Elicit and incorporate feedback
   • Practice evidence-based medicine
   • Educate others

6. Systems-Based Practice:
   • Understand health care resource allocation, cost, and weigh alternative options
   • Avoid and evaluate medical errors
   • Obtain appropriate consults
   • Co-ordinate discharge planning and discharge education
   • Recognize insurance coverage limitations and alternatives

Last updated 6.28.17 by J. Everhart
Appendix C: Expectations for Supervising Residents

Guidelines for Sub-I Patient Coverage at LPCH: Days

- Each morning, a supervising resident should make patient assignments/approve patient distribution between the sub-intern and the intern.

- To support the sub-intern's progression to "intern-like responsibilities" and after opportunity to assess sub-intern readiness, please attempt to distribute the patient load as evenly as possible between the intern and the sub-intern, preferably by the end of the first week. Supervisors should consider patient acuity, turnover (anticipated admits/discharges), and other key workflow issues when making patient assignment decisions. If the supervisor does not feel the sub-intern is prepared for this level of responsibility by week two, please contact Dr. Everhart to discuss.

- Sub-interns should write clinical notes on the patients assigned to them. An MD-generated daily note will need to be entered in Epic as well, for hospital billing. Supervising residents, not interns should enter a note for attending co-signature and billing.

- For supervisors: Co-signing and copying sub-intern notes:
  - You may co-sign sub-intern notes with a comment such as: "Please see today's progress note with my primary signature for approved modifications to the above note."
  - You may copy, paste, and actively edit the sub-I note (consider offering credit at the bottom - e.g., "Jane Doe, MS IV, assisted in preparation of this Progress Note"). Using bold, underlining, etc. helps the sub-intern notice which areas you've modified, augmenting their learning from your example. If it's easier for you to write your own note from scratch, you are welcome to do so, but it is not required.
  - It is okay for the attending to co-sign the sub-intern note in addition to your note, though attendings usually prefer to co-sign only one note per documentation event, your note.

- Sub-Is have dedicated Voalte roles to use during their rotations. To help ensure careful supervision and patient safety, the intern should be assigned primary team coverage in Voalte throughout the day shift (7 am - 5 pm). The sub-intern may assume this role while the intern is at clinic.
  - For days and nights: Sub-interns can work with the Stanford Paging Office to set up "shadow paging" so that LPCH Housestaff maintain possession of the primary team pager, while sub-interns receive duplicate pages to their Smartphones.
  - At handoff: Sub-interns should sign out their primary day patients to the on-call BY or RG Intern, with supervision of a Junior (Yellow) or co-intern (Red, Green).

Last updated 6.28.17 by J. Everhart
Guidelines for Sub-I Patient Coverage at LPCH: Night Float

- At night the sub-intern will work closely with the on-call BY or RG Intern, though the sub-intern will focus primarily on their assigned day team. Supervising resident should be involved in patient distribution each morning.

- Sub-Is have dedicated Voalte roles to use during their rotations. To help ensure careful supervision and patient safety, the intern should be assigned the primary team Voalte role throughout the night shift (5 pm - 7 am).

- To support sub-intern involvement and education, we ask that Interns please try to communicate with sub-I’s within the hour about any pages/calls they receive from the sub-I’s team patients (as workflow permits).

- Interns may delegate responsibilities related to these calls, according to their assessment of the sub-intern’s readiness to manage the issue independently (for example, some calls to fellows or family/RN questions may be managed independently by sub-interns, with close follow-up by intern and/or supervisor).

- When the sub-intern is updated by the primary RN directly, it is expected that he or she will update the intern and supervisor with this information promptly, clarify the plan, and update nursing as appropriate. At night: as of 2011, the LPCH Residency Program leadership has preferred that interns be actively involved in patient assessment and plan management for every overnight admission.

- It is preferred that (at night only) the intern (versus the supervising resident) generates the official billing H&P for attending co-signature. If a night is particularly busy, the supervisor should determine whether a "divide and conquer" approach makes more sense (i.e., supervising the intern and sub-intern on admissions separate from one another). More independence from the intern will generally be the sub-I’s general preference, but we also need to ensure a good educational experience for the intern. Bottom line, the supervisor is in charge of how admission responsibilities should work at night, and it is hoped that during the Night Float week the sub-I will have many great chances to work as much "like an intern" as possible.

- It is fine for sub-I’s to be involved in another team’s admissions if their primary team is very quiet, and if the supervisor deems it appropriate.

- An Epic document (generated by an intern or supervising resident) separate from the sub-intern H&P is required for each admission. If a sub-intern generates an initial H&P, the required MD documentation may be based on importation of a sub-I draft with active, complete editing.

- At morning handoff: Some sub-Is make it a goal to be able to give 6 am sign-out for their entire primary team (supervised).

- If you are ready to share any concerns or compliments about your night float experience with a sub-intern, please contact Elizabeth Stuart (aestuart@stanford.edu) or Jennifer Everhart (jeverhar@stanford.edu) to discuss. We will also contact you with an evaluation for the student.

Last updated 6.28.17 by J. Everhart
Appendix D: I-PASS Handoff Principles

Essentials of Team Function

<table>
<thead>
<tr>
<th>BARRIERS</th>
<th>TOOLS &amp; STRATEGIES</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational</td>
<td></td>
<td>Team Performance</td>
</tr>
<tr>
<td>Culture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>Brief Huddle</td>
<td>Shared Mental Model</td>
</tr>
<tr>
<td>Environment</td>
<td>Debrief</td>
<td>Patient Safety</td>
</tr>
<tr>
<td>Work Compression</td>
<td>Cross monitor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advocate &amp; Assert</td>
<td></td>
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<tr>
<td></td>
<td>Check-back</td>
<td></td>
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<tr>
<td></td>
<td>Feedback</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Handoffs</td>
<td></td>
</tr>
</tbody>
</table>

Handoff Best Practices

- Structured Verbal Handoff
  - Begin with overview of entire service
  - Ensure proper environment; limit interruptions
  - Use I-PASS mnemonic

- Printed Handoff Document
  - Supplements verbal handoff
  - Imports elements from EMR
  - Keep information current with updates

- High Level Skills
  - Be concise and focused
  - Establish working diagnosis
  - Include semantic qualifiers
  - Ensure check-back with receiver

The I PASS Mnemonic

1. Illness Severity
   - Stable, “Watcher,” Unstable

2. Patient Summary
   - Summary statement; events leading up to admission; hospital course; ongoing assessment, plan

3. Action List
   - To do list; timeline and ownership

4. Situation Awareness & Contingency Planning
   - Know what’s going on; plan for what might happen

5. Synthesis by Receiver
   - Receiver summarizes what was heard, asks questions; restates key action/to do items

Last updated 6.28.17 by J. Everhart
### Daily Carbohydrate Requirement

<table>
<thead>
<tr>
<th>Age</th>
<th>Initial</th>
<th>Advance</th>
<th>Goal (GIR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants (&lt;1 yr)</td>
<td>D10 (6-9 mg/kg/min)</td>
<td>D 2.5</td>
<td>12 mg/kg/min (max 14-18)</td>
</tr>
<tr>
<td>Children (1-10 yrs)</td>
<td>D10</td>
<td>D 2.5-5</td>
<td>8-10 mg/kg/min</td>
</tr>
<tr>
<td>Adolescent (11-18 yrs)</td>
<td>D 10</td>
<td>D 2.5-5</td>
<td>5-6 mg/kg/min</td>
</tr>
</tbody>
</table>

### Daily Protein Requirement

<table>
<thead>
<tr>
<th>Age</th>
<th>Initial</th>
<th>Advance</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 yr</td>
<td>1.5 g/kg/d</td>
<td>1 g/kg/d</td>
<td>2-3.0 g/kg/d</td>
</tr>
<tr>
<td>1-10 yrs</td>
<td>1-2 g/kg/d</td>
<td>1 g/kg/d</td>
<td>1.5-3 g/kg/d</td>
</tr>
<tr>
<td>11-18 yrs</td>
<td>1-1.5 g/kg/d</td>
<td>1 g/kg/d</td>
<td>1-2.5 g/kg/d</td>
</tr>
</tbody>
</table>

* Trophamine for patients < 6mo or on long term TPN
* Aminosyn for patients > 6mo

### Daily Lipid Requirement

<table>
<thead>
<tr>
<th>Age</th>
<th>Initial</th>
<th>Advance</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 yr</td>
<td>1-2 g/kg/d</td>
<td>0.5-1 g/kg/d</td>
<td>3 g/kg/d</td>
</tr>
<tr>
<td>1-10 yrs</td>
<td>1-2 g/kg/d</td>
<td>0.5-1 g/kg/d</td>
<td>1-2 g/kg/d</td>
</tr>
<tr>
<td>11-18 yrs</td>
<td>1 g/kg/d</td>
<td>1 g/kg/d</td>
<td>1-2 g/kg/d</td>
</tr>
</tbody>
</table>

* If Dbili elevated >2mg/dL, decrease IL to 1gm/kg/day
* Lipids should be <60% of daily calories
* Lipids run for same length of time as other TPN components

### Electrolytes

<table>
<thead>
<tr>
<th>Electrolyte</th>
<th>Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>2-4 mEq/kg/d</td>
</tr>
<tr>
<td>Potassium</td>
<td>2-3 mEq/kg/d</td>
</tr>
<tr>
<td>Chloride</td>
<td>2-4 mEq/kg/d</td>
</tr>
<tr>
<td>Acetate (Bicarb)</td>
<td>1-4 mEq/kg/d</td>
</tr>
<tr>
<td>Phosphate</td>
<td>0.5-2.0 mM/kg/d</td>
</tr>
<tr>
<td>Calcium Gluconate: &lt; 6 mo</td>
<td>300-400 mg/kg/d</td>
</tr>
<tr>
<td>6mo-10 yrs</td>
<td>100-200 mg/kg/d</td>
</tr>
<tr>
<td>&gt;10 yrs</td>
<td>50-100 mg/kg/d</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.25-1 mEq/kg/d</td>
</tr>
</tbody>
</table>

* Small adjustments (10-20%) based on labs
* Pt with ileostomy (no colon) will have higher Na and fluid needs

### Additional TPN Additives

1. Pediatric Trace elements (Cu, Mn, Zn, Cr) = 0.2mL/kg, max 5mL
   - Hold if Dbili >2, severe renal disease, or on long term TPN
   - If holding add 200mcg/kg/day of Zinc
   - If holding add 10mcg of copper
2. Pediatric Multi Vitamin =5mL up to 11 yrs and 10mL if >11 yrs

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3. Selenium should be added on day 31 at 2mcg/kg/day for long-term TPN
5. Heparin: 0.5units/ml for 0-1yr and 1unit/mL if >1yr (if normal coagulation profile)

**Fluid Goals**
- Based on 4-2-1 rule (Note TPN order entry program asks for fluid as ml/kg/day)
- TPN order entry allows entry of non TPN fluid volumes (i.e. drips, meds or enteral feeds). If these are entered, the program will take these into consideration to insure patient does not exceed entered fluid goal when making TPN.

**Infusion Time**
- Initially start with 24 hour infusions
- For patients that will be on long term TPN, it can be cycled to run for 12-18 hours
  - Decrease cycle length 2 hours/day for 0-6 yrs and by 4 hrs/day for >6 yrs
  - Ramp up and down infusion rate over 2 hours when using D12.5% or higher
  - Check glucose one hour into max rate and one hour after infusion when adjusting cycle lengths
  - When outside of LPCH, cycle length calculator available at [www.peds.stanford.edu](http://www.peds.stanford.edu) under “Links” and “Patient Care Tools”

**Monitoring**
1. Initiate “TPN Monitoring” lab order set in Cerner
   - Prior to ordering TPN = CBC, MetC, Mg, Phos, triglyceride , D-bili, GGT, Coags, UA
     - CXR to insure proper placement of central line
     - Do NOT order a Chem 23
   - TPN days 1-4 = Daily renal function panel, Mg, triglyceride, and UA
   - Long Term inpatient monitoring
     - qMonday = CBC, MetC, Mg, PO4, D-bili, GGT, triglyceride
     - qThursday = Renal function panel, magnesium, triglyceride
2. Change in status of patient/care
   - If patient status, medications, or care plan changes with potential impacts to electrolytes or liver function, consider more frequent labs
3. Nutrition Support Service is automatically consulted for patients on TPN. Check for “Nutrition Assessments” in Care Form Notes (inpatient) or in Ancillary Documents (outpatient) sections of Clinical Documents.

**Peripheral Lines**
Maximums: Dextrose D12.5%, Protein 3.5%, Potassium 40 mEq/L, Calcium 3 g/L, Osmolarity 950 mOsm

**Long Term TPN Patients**
Attempt to obtain home recipe (from their pharmacy or on their home bag of TPN). If no recipe is available prior to LPCH TPN pharmacy closing for the day, consult with the fellow to determine an appropriate dextrose and electrolyte solution until TPN can be made.

**TPN is a medication with potential for harm if ordered or used incorrectly. This resource should serve as a guide for the initiation and adjustment of TPN. It is not all encompassing and should be used in conjunction with ongoing assessment of the patient’s status and with input from the LPCH Nutrition Support Team.**

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