Triage by Resource Allocation for Inpatients (TRAIN™)

Overview
Developed by Stanford Children’s Health

- Used for the following populations:
  - Neonatal
  - Pediatrics
  - Obstetrics
  - Adults

- Programmed in 2 different electronic health records
- Easy just-in-time training
- Used in multiple organization
- Consulting with multiple organization on implementation
- Used for all disaster drills
TRAIN™ Objectives

• Be able to *quickly assess* and *accurately request* the *right resources* from the emergency operations center.
• Streamline communication with a common code.
• Implement a standardized and automated inpatient hospital evacuation triage system with *minimal impact to workflow*.
• Increase awareness and disaster preparedness across the institution and region.
Status of Medical Triage

- Designed for Mass Casualty Events [MCE].
- Adapted from military for battlefield use.
- Currently the only types of trauma scoring systems involve pre-hospitalization assessment and predictors of morality $^{2-4}$.
- Difficult to apply during hospital disaster.
Present - Challenges

- Limited transportation resources
- No standardized system currently exist for rapidly triaging patients in alignment with the available transportation resources.
- An evacuation of a free standing children’s hospital would immediately be a regional incident due to the nature and complexity of the patients.
TRAIN™ – What is it?

- Disaster triage tool designed for hospitalized patient movement
- Based on resource needs of patient to determine appropriate level of transport for evacuation
- Created by expert opinion and aligned with local EMS protocols for transport
Basis of Neonatal/Pediatric TRAIN™

Life Support
Mobility
Nutrition
Pharmacy

Blue = Car
Green = BLS
Yellow = ALS
Orange = CCT
Red = Specialized
(Expectant Care)
Blue

**Transport**: Car or Bus

**Life Support**: Stable / No monitoring Needed

Room air

Uncomplicated drains (i.e. bili or JP drains)

**Mobility**: Car/Carseat

No specialized equipment needed to transport patient

**Nutrition**: PO Feeds

Oral feeds only with no tube feeds

**Pharmacy**: PO Meds

Oral meds only / No intravenous medications
**Green**

**Transport:** Ambulance (BLS)

**Life Support:** Minimal

Low cannula or hood oxygen

**Mobility:** Wheelchair/stretcher- Baseline

Restricted mobility due to devices (i.e.: spica casts, traction, halos, etc.)

**Nutrition:** PO/NG

Oral feeds in combination with tube feeds

**Pharmacy:** PO Meds/IV Meds

Intermittent intravenous medications
Yellow

Transport: Ambulance (ALS)
Life Support: Minimal – may require monitoring
Oxygen Hood or Chest Tube
Peritoneal dialysis (intermittent)
Mobility: Wheelchair/stretcher - Baseline
Nutrition: Internment or Continuous tube feeds/Short Term NPO
Pharmacy:
Standard IV fluids (i.e.: dextrose with electrolytes, etc)
Transport: Critical Care
Ambulance with RN+/-RT+/-MD
Life Support: Moderate-stable
Ventilator, CPAP/BiPAP/Hi-Flow/Continuous Nebulizer
Weight ≥ 1500 grams
Nutrition: NG/PO + TPN/IL or NPO
Combination enteral and parenteral or total TPN/IL
Pharmacy: IV drips x 1
Single intravenous drip (i.e., Insulin, basal narcotic drip, pressers, etc.)
Red

Transport: Specialized
Ambulance or Military-supported transport with combination of multiple RNs, likely MD and RT

Life Support: Max-unstable highly specialized equipment
High Frequency Oscillator, ECMO, Inhaled Nitric Oxide
Continuous Veno-Venous Hemofiltration
Ventricular Assist Devices, Etc.

Mobility: Immobile requiring specialized equipment, Isolette-dependent for temperature regulation and less than 1.5 kg

Nutrition: No enteral feeds parenteral nutrition only

Pharmacy: IV drips 2 or greater
# Neonatal/Pediatric TRAIN™ Tool

<table>
<thead>
<tr>
<th>Transport</th>
<th>Blue/Car</th>
<th>Green/BLS</th>
<th>Yellow/ALS</th>
<th>Orange/CCT</th>
<th>Red/Specialized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Support</td>
<td>Stable</td>
<td>Stable +</td>
<td>Minimal</td>
<td>Moderate</td>
<td>Maximal</td>
</tr>
<tr>
<td>Mobility</td>
<td>Car/Carseat</td>
<td>Wheelchair or Stretcher</td>
<td>Wheelchair or Stretcher</td>
<td>Stretcher</td>
<td>Incubator or Immobile</td>
</tr>
<tr>
<td>Nutrition</td>
<td>All PO</td>
<td>Intermittent Enteral</td>
<td>Continuous Enteral or Partial Parenteral</td>
<td>TPN Dependent</td>
<td></td>
</tr>
<tr>
<td>Pharmacy</td>
<td>PO Meds</td>
<td>IV Intermit meds</td>
<td>IV Fluids</td>
<td>IV Drip x1</td>
<td>IV Drip ≥2</td>
</tr>
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## Life Support
- **Stable +** = Low flow oxygen
- **Minimal** = Oxygen hood, chest tube, etc.
- **Moderate** = CPAP/BiPAP/Hi-Flow, Conventional Ventilator, Peritoneal Dialysis, Externally paced, continuous nebulizer treatments, etc.
- **Maximal** = Highly specialized equipt., e.g., Neonatal Ventilator, HFOV, ECMO, iNO, CVVH, Berlin Heart, wt ≤ 1.5 kg, specialized medical personnel, etc.

## Mobility
- **Car/Carseat** = Able to ride in automobile with age-appropriate restraints
- **Incubator** = Transport incubator with equipment for connecting to ambulance
- **Immobile** = Unsafe to move without special equipment e.g., neurosurgical/bariatric
## Neo/Peds TRAIN™ Example

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<th>Transport</th>
<th>Blue/Car</th>
<th>Green/BLS</th>
<th>Yellow/ALS</th>
<th>Orange/ CCT</th>
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Neveah is a 3 day old ex-29-week premature baby girl who has persistent pulmonary hypertension. She is requiring high frequency oscillatory ventilation with inhaled nitric oxide. She has been NPO and is on total parenteral nutrition and multiple IV drips for sedation and blood pressure support.

Neveah would be **RED** due to HFOV.
Basis of TRAIN™ for Obstetrics

Antepartum/L&D
- Labor Status
- Mobility
- Anesthesia Status
- Maternal and/or Fetal Risk Factors

Postpartum
- Delivery
  - NSVD vs C-section
  - Time from delivery
- Mobility
- Anesthesia Status
- Maternal Risk Factors
## OB TRAIN™ for Postpartum

<table>
<thead>
<tr>
<th>Transport</th>
<th>Car (Discharge)</th>
<th>BLS</th>
<th>ALS</th>
<th>SPC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delivery</strong></td>
<td>VD &gt; 6 hours or CD &gt; 48 hours</td>
<td>VD &lt; 6 hours or CD &lt; 48 hours</td>
<td>Complicated VD or CD</td>
<td>Medically complicated</td>
</tr>
<tr>
<td><strong>Mobility</strong></td>
<td>Ambulatory*</td>
<td>Ambulatory or Non-ambulatory</td>
<td>Ambulatory or Non-ambulatory</td>
<td>Non-ambulatory</td>
</tr>
<tr>
<td><strong>Post Op</strong></td>
<td>&gt; 2 hours from non-CD surgery**</td>
<td>&gt; 2 hours from CD &lt; 2 hours from non-CD surgery</td>
<td>&lt; 2 hours from CD</td>
<td>Medically complicated</td>
</tr>
<tr>
<td><strong>Maternal Risk</strong></td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Moderate/High</td>
<td>High</td>
</tr>
</tbody>
</table>

(S) Specialized = must be accompanied by MD or Transport RN
* Modified Bromage Score 6 = Patient is able to perform a partial knee bend from standing
** If adult supervision is available for 24 hours
## OB TRAIN™ for L&D

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<thead>
<tr>
<th>Transport</th>
<th>CAR (Discharge)</th>
<th>BLS</th>
<th>ALS</th>
<th>SPC</th>
<th>SHELTER IN PLACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor status</td>
<td>None</td>
<td>Early</td>
<td>Cervical dilation ≥4 cm</td>
<td>At risk for en route delivery</td>
<td>If delivery is imminent or patient is unsafe for transport</td>
</tr>
<tr>
<td>Mobility</td>
<td>Ambulatory*</td>
<td>Ambulatory or Non-ambulatory</td>
<td>Non-ambulatory</td>
<td>Non-ambulatory</td>
<td></td>
</tr>
<tr>
<td>Epidural status</td>
<td>None</td>
<td>Placement ≥1 h**</td>
<td>Placement &lt;1 h**</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Maternal risk</td>
<td>Low</td>
<td>Low/Moderate</td>
<td>Moderate/High</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Fetal monitoring in transit</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

BLS = Basic Life support (Emergency Medical Technician-staffed ambulance); ALS = Advanced Life Support (Paramedic-staffed ambulance); SPC = Specialized (must be accompanied by MD or Transport Nurse)

* Able to rise from a standing squat

** Epidural catheter capped off
Obstetric TRAIN™ Triage Example

26yrs @ 40 weeks

- Early labor: 4cm
- Can ambulate
- No epidural
- Cat 1 FHR
- No significant maternal or fetal risk factors
TRAIN™ – How and when it is used

• Quickly identifies institutional transport needs for vertical or partial evacuation
• Highlights potential patients for rapid discharge when surge capacity is needed
• Uses standardized language for resources for allocation
• Enables expedient resource requests from other agencies
Limitations of TRAIN™

- Not necessarily associated with acuity*
- Does not assign ambulance
- Does not designate transfer location
TRAIN™ – Day at a Glance

N = 228 patients

- Blue: 38 patients
- Green: 36 patients
- Yellow: 73 patients
- Orange: 61 patients
- Red: 20 patients

Patients assessed as Blue may be rapidly discharged in the event of evacuation or to increase surge capacity.

County EMS Resources:
- Green = 36 BLS
- Yellow = 73 ALS
- Orange = 61 CCT
- Red = 38 Specialized
TRAIN™ - Solution
Triaging by Resource Allocation for Inpatients

1. TRAIN™ will facilitate rapid triage of patients’ transport needs before a disaster requiring evacuation occurs.

2. It will provide the ability to quickly and accurately request the right resources using common language from the county/EOC in the event of an evacuation.

3. It will increase awareness and readiness for emergency operations across the institution.
Other Potential Uses for TRAIN™

- Planned evacuation – movement to another building vs staged evacuation due to disaster
- Lateral evacuation – movement within the building (daily management)
- Enhance surge capacity planning – rapid discharge of Blue patients
Next Steps: Identify Your Implementation Team

- Team Leader
- IS
- Operations
- Office of Emergency Management
- Nursing
- Providers
- Administrative support
Learn More

Join the TRAIN™ Consortium: Coordinated Care with a Common Code

• Implementation (10 hours)
  □ Presentation to Implementation Team
  □ TRAIN™ Case-Based Education
  □ TRAIN™ Assessment
  □ Presentation of eTRAIN™ to Informatics
  □ Local testing for accuracy

• Validation (8 hours)
  □ Remote and In-person validation

• Quality Assurance/Continuing Education
  □ Annual audit reports sent to Stanford for review
  □ Webinars related to TRAIN™ algorithm updates as needed

Contact Us: TRAIN@stanfordchildrens.org
Reference


