Fixing the Front End: Using ESI Triage v.4 To Optimize Flow

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For
The ESI Triage Research Team
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In Memory Of:
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Richard C. Wuerz, MD
1960-2000
On Behalf Of The ESI Triage Research Team

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Rich Wuerz

Thank you for the invitation!
Introduction

■ The “ED Problem”
■ ED Triage - ?
■ ESI Triage
  – Background
    » History and development
      ■ Make clear the ESI versions (4); show a couple of major highlights from our work
Introduction

- ESI Triage
  - What it is and how it is implemented
  - What’s new in version 4

- What you can do with it once it’s implemented

- How to get ESI v.4 from the AHRQ
  - Implementation manual
  - Training video

At no cost
THE ED Problem
Emergency Medicine Explained

1. patient arrives
2. stuff happens
3. patient leaves
U.S. Emergency Department Visits

www.acep.org

The Good News!
The Bad News…
U.S. GAO, 1993

urgent
40%

emergent
17%

43%
non-urgent
“The Emergency Department Problem”
Silver, Manegold, JAMA Oct 24, 1966

- ED visits rose 175% from 1955-1965
- 42% ‘nonurgent’ problems

Factors contributing to “the problem”:
- Mobility (no primary doctor)
- Difficulty finding a physician at night!
- Indigent populations
- 24/7 diagnostic facilities at hospital
Health Care Debate
and through the 1990’s

- “…the most costly care of all…” (Mr. Clinton)
  - Marginal costs of minor emergencies = $25 (Bob Williams)
- Use of ED as source of primary care ongoing
  - 43 M without health insurance
  - Insurance card does not equal access
- Definition of ‘emergency’
  - Prudent layperson language
Definition of ‘emergency’

- life threat
- life or limb threat
- results in hospital admission or operation
- requires care within 2 hours
- requires care within 24 hours
- severe pain
- my lawyer sent me in to get checked
Other ED Problems

- **Cost**
  - Perception that we ‘cost way too much’

- **Quality\Satisfaction**
  - Variation in timeliness to care perceived by ED patients
  - Single biggest thing ED patients complain about is wait time

- **Now overcrowding:** “access block” by Aussies

- **→ Safety and nursing exodus**
What is ED triage?
Why do we do it?
What does ED triage have to do with any of this anyway?
ESI TRIAGE: Background
Driver of My Interest

Operations Management: Reengineering 101 (‘94)
- Pick a business that’s in trouble (The YH ED)
- Identify it’s key business processes (?)
- If something is broken – FIX IT!

Every one did it, but everyone did it differently – even the same nurse later
Driver of My Interest

- Team paper “Reengineering The ED – Fixing Triage”: Streaming, not just sorting
- Predictive management and modeling
- ESI was developed (Wuerz and Eitel) so we could flow [map] and then model the ED
We in health care delivery are in a service business and must begin to manage it as such.

There is a science of services management, within the discipline of operations management. We should begin to train our hospital/health care managers in the core concepts, content and tools of services management. Just released report form National Academy of Sciences: “Building a Better Delivery System: A New Engineering/Health Care Partnership”.

Services vs. Products
Services vs. Products

**Recommended Reading**
Service Management 3rd Edition Fitzsimmons
ISBN 0-07-231267-x

Ch 10 Forecasting Demand For Services
Ch 11 Managing Waiting Lines
Ch 12 Queuing Models (Server) & Capacity Planning
Ch 13 **Managing Capacity & Demand**
ESI TRIAGE:
Development
BWH Triage Guidelines
before 4/99

- **Emergent**: 1%
  - requires immediate evaluation & treatment

- **Urgent**: 65%
  - can tolerate a period of time in the waiting room

- **Non-urgent**: 35%
  - minor illness/injury that can be treated within six hours
Emergency Nurses Association

- **Emergent/1:**
  - Life- or limb-threatening illness/injury

- **Urgent/2:**
  - Requires prompt care, but will not cause loss of life or limb if left untreated for several hours

- **Non-urgent/3:**
  - Time is not a critical factor; minor illness or injury
# Triage Data Report YH ED 1997

<table>
<thead>
<tr>
<th>TRIAGE</th>
<th>VOLUME</th>
<th>%</th>
<th>ADMIT %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-Apr 97</td>
<td>Level 1</td>
<td>302</td>
<td>2 %</td>
</tr>
<tr>
<td>18,029 visits</td>
<td>Level 2</td>
<td>4,577</td>
<td>25 %</td>
</tr>
<tr>
<td>22 % admits</td>
<td>Level 3</td>
<td>13,150</td>
<td>73 %</td>
</tr>
</tbody>
</table>
Inconsistency of Triage


- 87 nurses, two academic EDs
- triaged 5 standardized patients scenarios
  - using their three-level scale scales
- Between raters: only 35% agreement beyond chance
- Test-retest: repeat triage of same cases
  - only 25% triaged the same both times
- Conclusion: the instrument is too blunt! (no instrument...)
What Else Is Out There?

- Australian National Triage Scale-1994
- Canadian Triage and Acuity Scale-1996
- Manchester Triage-1997
This patient *can wait no longer than*...to see a physician

### Australian & Canadian Triage

<table>
<thead>
<tr>
<th>Triage level</th>
<th>NTS</th>
<th>CTAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 min</td>
<td>0 min</td>
</tr>
<tr>
<td>2</td>
<td>10 min</td>
<td>15 min</td>
</tr>
<tr>
<td>3</td>
<td>30 min</td>
<td>30 min</td>
</tr>
<tr>
<td>4</td>
<td>60 min</td>
<td>60 min</td>
</tr>
<tr>
<td>5</td>
<td>120 min</td>
<td>120 min</td>
</tr>
</tbody>
</table>
What is ED triage?
Why do we do it?
A principal goal of Triage should be: To determine who should be seen first. Right?
If that is the only question asked →

*How long do you think everyone should/could wait?*
A second major goal: should be not to just “sort” but to “stream”

- to get the right patient to the right resources in the right place and at the right time
The Triage Game!

**Observation**: if case scenarios were given - “what will this patient need…” nurses were in agreement
There are *big emergencies*, and there are *little emergencies*

P.S. Experienced ED nurses are excellent at this! (especially those *potentially* big emergencies...)
If your little girl falls and cuts her forehead, her face is all bloody, and she needs stitches - is that an emergency?
ED Triage - is not just about time:

It’s about resources!
Manage by thinking \textit{flow 1st}, not capacity \textit{1st (beds)}.

“The Goal”
by Goldratt
To manage by *flow*, have to first decide how to *stream* incoming patients.
In ESI © triage two questions are asked:

Not only who should be seen first,

But also, what does the patient need, in terms of resources, to reach a disposition?
Those in need of few resources but the doc-nurse team can bypass the main ED. The parallel processing of patients can occur – if patient categorization is done reliably.
The Bad News…
U.S. GAO, 1993

- **urgent**: 40%
- **emergent**: 17%
- **non-urgent**: 43%
The ESI © V. 1 Triage Algorithm

- Over time: five levels, explicit definitions, logic embedded in complex tables
- In August 1998 → Breakthrough: flowchart-based algorithm (Tufte)
- Adults only in ESI v.1 (> age 14)
Vital Sign Criteria To Up-Triage

- No clear consensus in the literature on ‘abnormal vital signs’
- SIRS (not SARS) criteria adopted
Reliability & Validity

- **Reliability**: reproducibility & repeatability of a measurement tool (instrument)
  - Inter-rater agreement
  - Test-retest agreement

- **Validity**: Or the “So What?” question:
  - Predictive validity
  - Reliability begets predictability
  - Operational outcomes associated with each triage level
Retrospective Work
Completed October-December 1998
Produced the Following Paper:

Reliability and Validity of a New Five-Level Triage Instrument: AEM March 2000

<table>
<thead>
<tr>
<th>Nurse-prospective</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>Physician-retrospective</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td></td>
<td>2</td>
<td>2</td>
<td>84</td>
<td>12</td>
<td>1</td>
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<tr>
<td></td>
<td>3</td>
<td>0</td>
<td>13</td>
<td>81</td>
<td>12</td>
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<td>4</td>
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<tr>
<td></td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

Weighted kappa=0.81, p<.001
Initial Adult-ESI Validation Results

Inpatient Admission

Operational outcomes that made sense by triage class
ESI © v.1 (Adult) Implementation

- April 1, 1999 UNC-Chapel Hill and April 15, 1999 @ The Brigham
- ED leaderships decided to replace existing three-level triage with the new ESI © five-level triage algorithm
- Nurses trained 1.5 hour standardized educational package included a didactic presentation, a group discussion of triage case scenarios, and a 20-case post-test and photos; everyone was informed
- This is how you too should implement ESI Triage
ESI © v.2: All-Age 1999

- Same five levels, explicit definitions
- Peds criteria were added (potentially bacteremic) and vitals signs upgraded August 1999
- Research team in place
  - $50,000 AHRQ grant awarded in August 1999
- Multi-site implementation of ESI v.2
That Multi-Site Implementation Resulted In This Paper:

ESI TRIAGE DEVELOPMENT

Version 2 vs. 3
**patient dying?**

- yes → **1**
- no

**shouldn’t wait?**

- yes
- no → **2**

**how many resources?**

- none
- one
- many

**vital signs**

- yes
- no → **3**

---

**consider**
ESI TRIAGE v.3 DISTRIBUTION
ENA Handbook
The Emergency Severity Index Implementation Handbook: A Five-Level Triage System/

Contains ESI v.3 (consider)

THIS IS NO LONGER AVAILABLE FROM THE ENA

ESI v.4 IS OUT & WITH A NEW PUBLISHER
ESI TRIAGE:
What’s New In Version 4?
What’s new in ESI Version 4?

- Level 1 Criteria Expanded
  - Tanabe et al AEM June 2005
    - "Refining Emergency Severity Index Triage Criteria".
- Pediatric Fever Criteria Updated
ESI Triage Algorithm v.4

A

requires immediate life-saving intervention?

no

B

high risk situation?
 or
confused/lethargic/disoriented?
 or
severe pain/distress?

yes

1

yes

2

© ESI Triage Research Team 2005
ACEP’s Pediatric Fever Criteria
Adopted

The American College of Emergency Physician’s Clinical Policy for Children Younger than 3 Years Presenting to the Emergency Department with Fever 2003 guidelines are included
What Can You Do With ESI Triage?
“The job of management is prediction.”

Dr. Deming

Reliability begets predictability
ESI Triage Algorithm v.4

A

requires immediate life-saving intervention?

B

high risk situation?

or

cnfused/lethargic/disoriented?

or

severe pain/distress?

yes

no

1

2

ESI Triage Research Team 2005
Real Time Management of Patient Flow

- Level 1’s and 2’s go to your critical care area
- Most level 4 and 5’s go to another area of your ED (“urgent care”) NOT triage away AT THE SAME TIME

THE PARALLEL PROCESSING ABILITY
Communicating ED Workload To Others

- The definitions used to differentiate patients with ESI triage are explicit and thus easily understood – by clinicians and non-clinicians - such as hospital administrators.
- You are on your way to a meeting where you will discuss ED staffing and the negative effects overcrowding is having on patient safety and staff retention.
Communicating ED Workload To Others

- Last evening you had 6 level 2 patients who had to remain for 5 hours in your waiting room:
  
  a high risk situation;
  
  confused/lethargic/disoriented;
  
  or in severe pain or distress

- This was of great concern to your competent and motivated staff last night, all of whom felt terrible that they could not provide better patient care
Communicating ED Workload To Others

- You can begin to have much more meaningful discussions with your administrators about your ED resourcing needs...
Physical Plant and Staffing Decisions

- If nearly 40% of your ED’s presentational case mix are 4’s & 5’s – do you really need a bigger ED to handle your volume, or do you need a simple re-design of your existing space?
Say 40% of your ED’s presentational case mix are 4’s and 5’s. How many types docs/NP’s/PA’s are you likely to need for that kind of case mix?

– Particularly if you knew that 65-70% of 4’s and 5’s are “boo-boo’s” (trauma related)

Do insurance companies, in general, pay for boo-boo management? Yes, for docs…but NP/PA reimbursement is highly state and region specific
Multiple Hospital ED Capacity Planning

- If you have several ED’s in your system (country; consulting mix) how might you think about staffing at each site if you had ESI-driven *reliable ED case mix data* available to you across those ED’s?

- Or, if you are a health planner how could ESI’s *reliable ED case mix data* help you?
Case Mix by Site

ESI© Triage Level

% Patients

1 2 3 4 5

BW FH 17th MH YH UNC LVCC
Downstream Hospital Readiness

See next
**Presentational Case Mix Data**

(“can manage the waiting room…”)

<table>
<thead>
<tr>
<th>Triage Level</th>
<th>Case Mix (% total)</th>
<th>Admit Rate</th>
<th>Resource Intensity</th>
<th>ED LOS (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>125 (2%)</td>
<td>73%</td>
<td>80%</td>
<td>2.4</td>
</tr>
<tr>
<td>Level 2</td>
<td>1,756 (22%)</td>
<td>54%</td>
<td>90%</td>
<td>4.0</td>
</tr>
<tr>
<td>Level 3</td>
<td>3,173 (39%)</td>
<td>24%</td>
<td>73%</td>
<td>3.4</td>
</tr>
<tr>
<td>Level 4</td>
<td>2,197 (27%)</td>
<td>2%</td>
<td>47%</td>
<td>2.0</td>
</tr>
<tr>
<td>Level 5</td>
<td>812 (10%)</td>
<td>.003%</td>
<td>14%</td>
<td>1.4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>8,063</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Services Operations Management
Concepts, Content, and Tools

With ESI **case mix data**, some that available:

- Demand analysis and statistical forecasting
- Capacity to serve planning: optimize staff scheduling (rostering) to predicted demand
- ED workflow diagramming (ED service unit mapping) and conceptual [static] modeling
- The Lean (Process Excellence) business improvement method
- Enhanced discrete event simulation modeling
How Can You Get ESI v.4 Triage?

√ Implementation Handbook

√ Training DVD
Emergency Severity Index, Version 4: Everything You Need To Know

Emergency Severity Index, Version 4: Implementation Handbook

Agency for Healthcare Research and Quality
Got a Good Idea? www.ahrq.gov
www.ahrq.gov/research/esi

Download a pdf version of the Implementation Handbook, fully licensed
www.ahrq.gov/research/esi

800-358-9295

Request up to (was 3) now 1 free copy of:

The spiral bound Handbook

The Everything You Need To Know Training DVD
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