

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

**David Eitel MD MBA**

**For**

**The ESI Triage Research Team**

**[daveitel@cyberia.com](mailto:daveitel@cyberia.com)**

# **In Memory Of:**

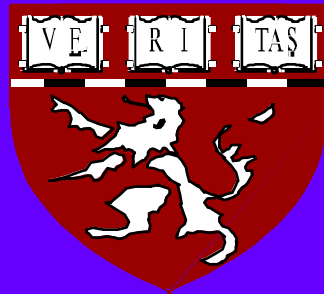
**Richard Wuerz MD**

**Associate Clinical Director**

**Department of Emergency Medicine**

**Brigham and Women's Hospital**

**Harvard Medical School**





**Richard C. Wuerz, MD**  
1960-2000



# **On Behalf Of The ESI Triage Research Team**

**Dave Eitel**

**Nicki Gilboy**

**Alex Rosenau**

**Paula Tanabe**

**Debbie Travers**

**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
      - 2<sup>nd</sup> more detailed presentation is available

# 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 *At no cost*
  - Training video

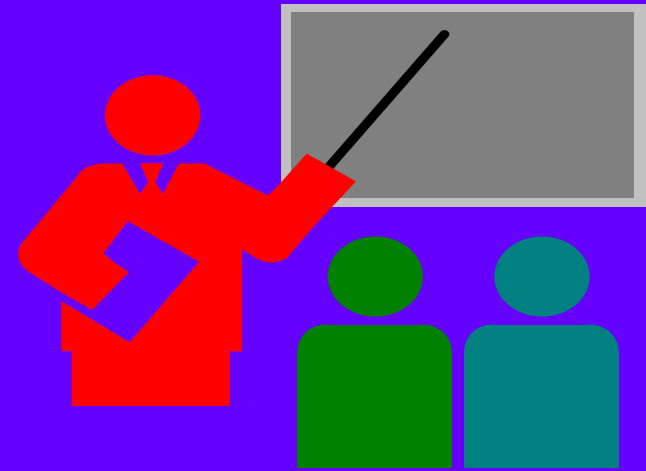
# THE ED Problem

# Emergency Medicine Explained

1 patient arrives

2 stuff happens

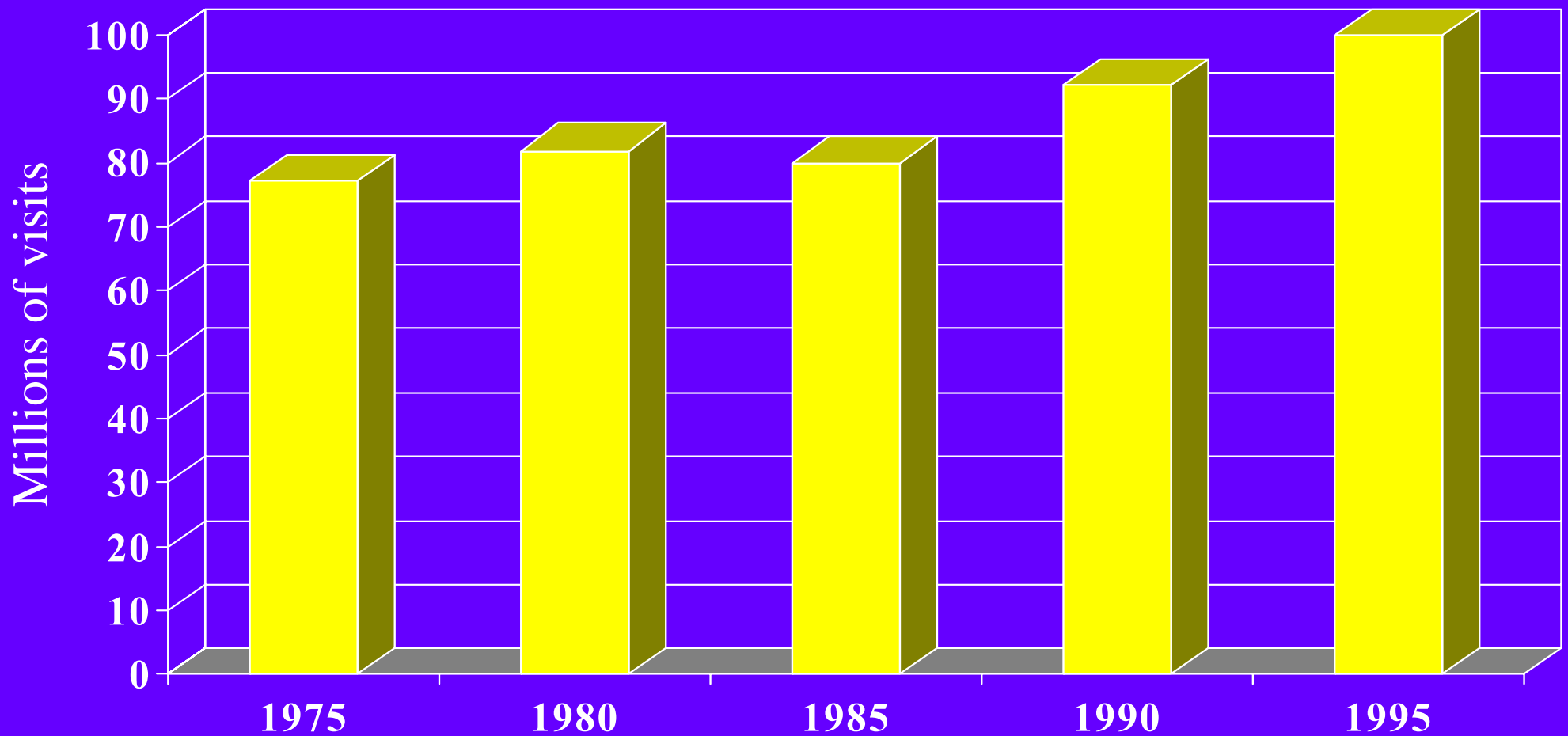
3 patient leaves



# U.S. Emergency Department Visits

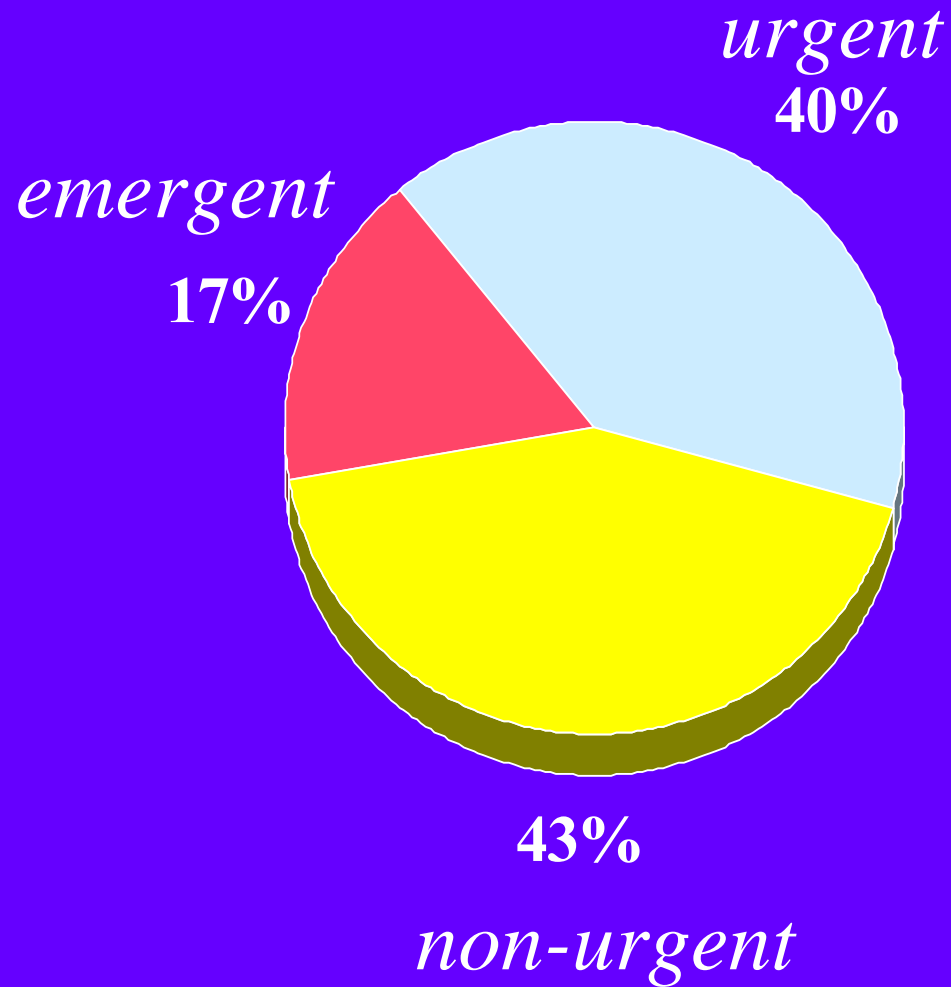
[www.acep.org](http://www.acep.org)

**The Good News!**



# The Bad News...

U.S. GAO, 1993



# **“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

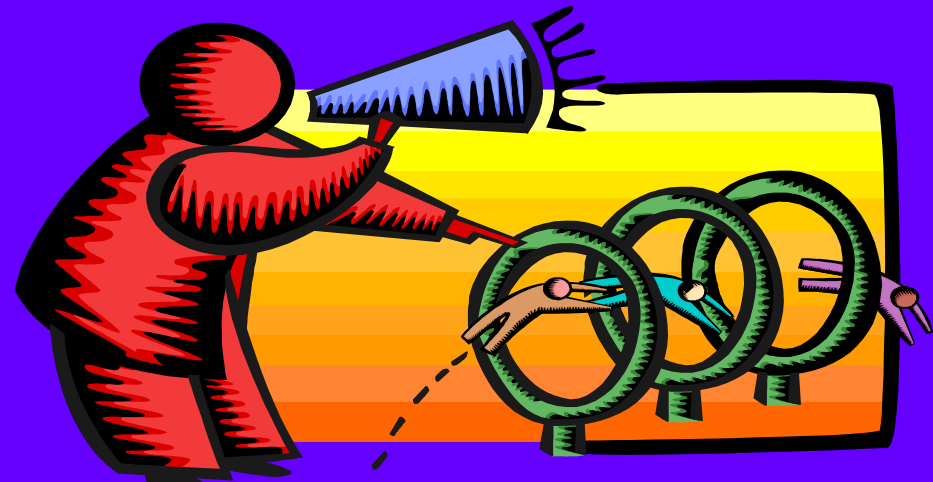
- Perception that we ‘cost way too much’

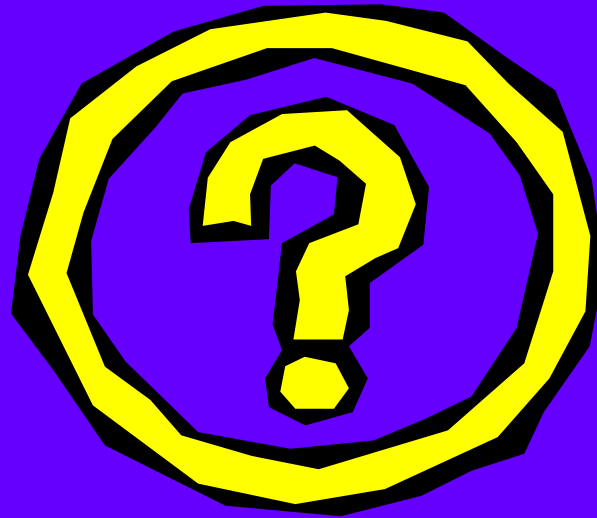
## ■ Quality\Satisfaction

- 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

# Services vs. Products

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 precepts, methods and tools of service management.*

# Services vs. Products

## Recommended Reading

Service Management 3<sup>rd</sup> Edition Fitzsimmons

ISBN 0-07-231267-x

Ch 10 Forecasting Demand For Services

Ch 11 Managing Waiting Lines

Ch 12 Queuing Models & 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

	<b>TRIAGE</b>	<b>VOLUME</b>	<b>%</b>	<b>ADMIT %</b>
<b>Jan-Apr 97</b>	<b>Level 1</b>	<b>302</b>	<b>2 %</b>	<b>69 %</b>
<b>18,029 visits</b>	<b>Level 2</b>	<b>4,577</b>	<b>25 %</b>	<b>51 %</b>
<b>22 % admits</b>	<b>Level 3</b>	<b>13,150</b>	<b><u>73 %</u></b>	<b><u>11 %</u></b>

# Inconsistency of Triage

**Wuerz: Ann Emerg Med Oct 1998**

- 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?

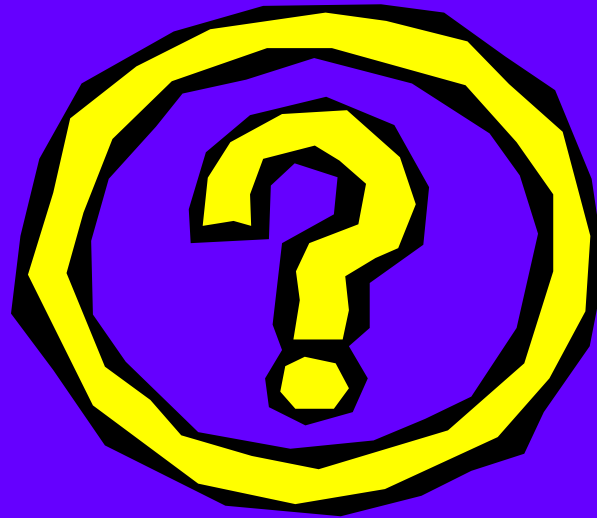
- Australian National Triage Scale-1994
- Canadian Triage and Acuity Scale-1996
- Manchester Triage-1997



# **This patient *can wait no longer than...* to see a physician**

## **Australian & Canadian Triage**

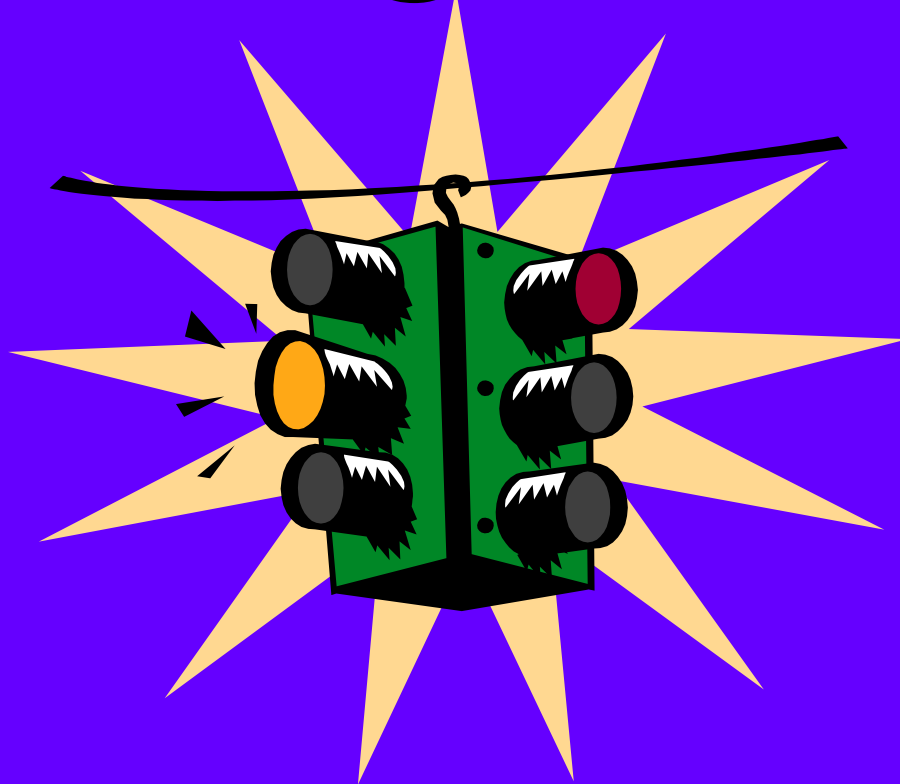
<b>Triage level</b>	<b>NTS</b>	<b>CTAS</b>
<b>1</b>	<b>0 min</b>	<b>0 min</b>
<b>2</b>	<b>10 min</b>	<b><u>15 min</u></b>
<b>3</b>	<b>30 min</b>	<b>30 min</b>
<b>4</b>	<b>60 min</b>	<b>60 min</b>
<b>5</b>	<b>120 min</b>	<b>120 min</b>



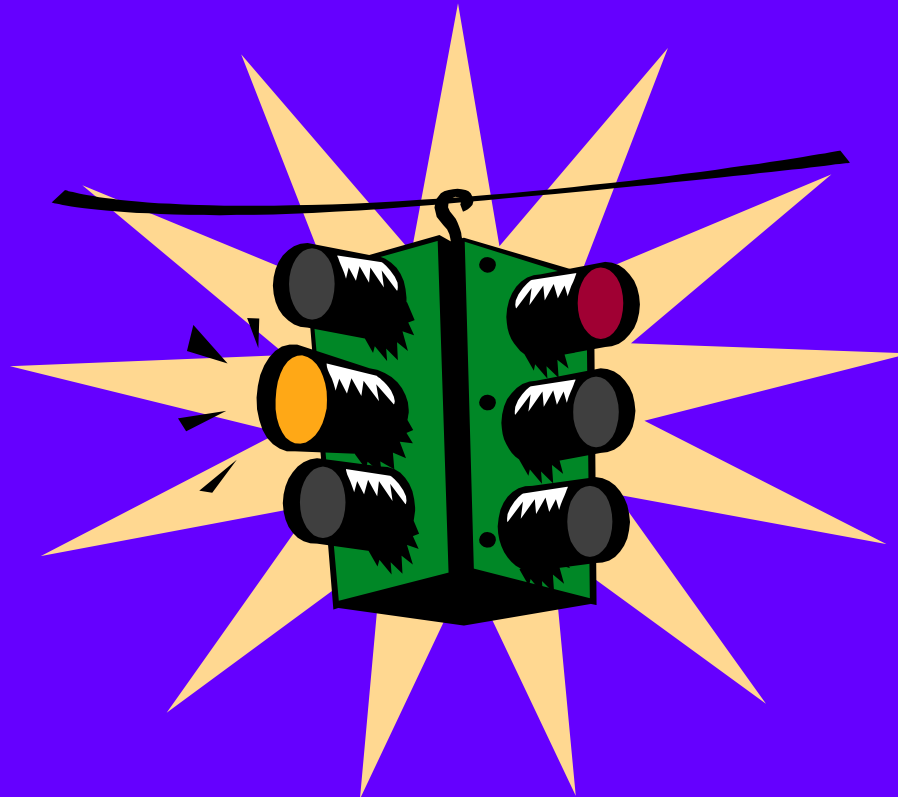
**What is ED triage?**  
**Why do we do it?**

**A principal goal of Triage should be:  
To determine who should be seen first.**

**Right?**

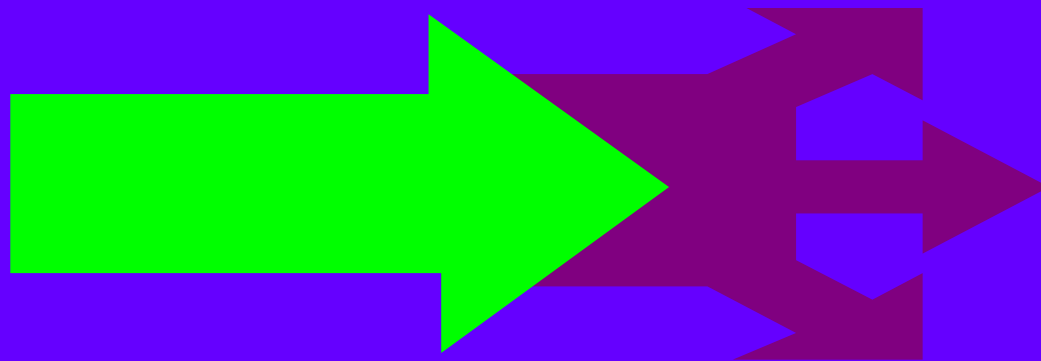


If that is the only question asked →  
*How long do you think everyone  
should/could wait?*



# **A second major goal should be not just to “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:**



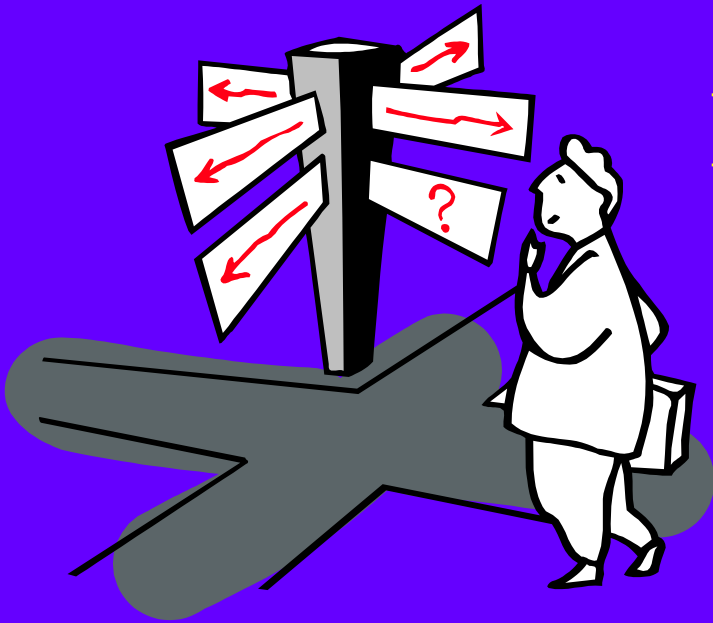
***It's about resources!***

**Manage by thinking *flow 1st*,  
Not capacity (beds) 1<sup>st</sup>.**



**“The Goal”  
by Goldratt**

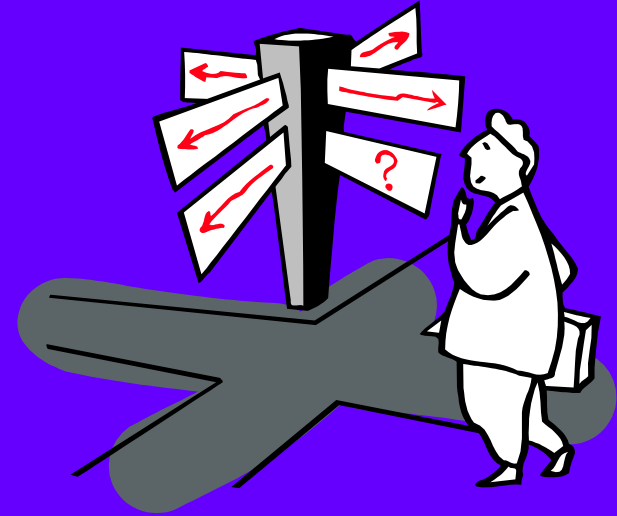
**To manage by *flow*,  
have to first decide  
how to *stream*  
incoming patients**

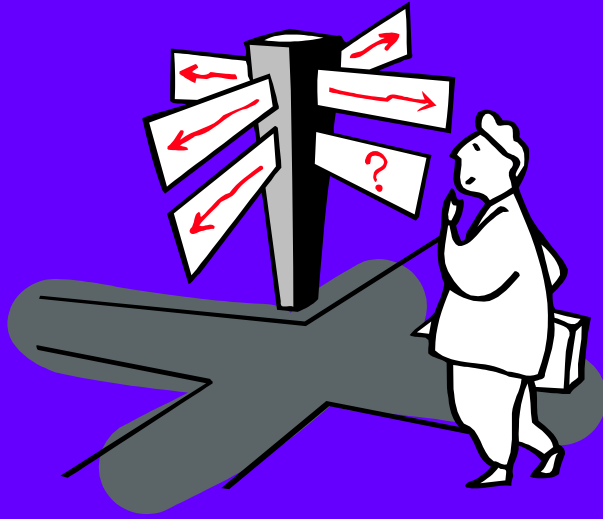


**In ESI © triage two questions are asked:**

**Not only who should be seen first,**

***But also, what does the patient need, in terms of resources, to reach a disposition?***

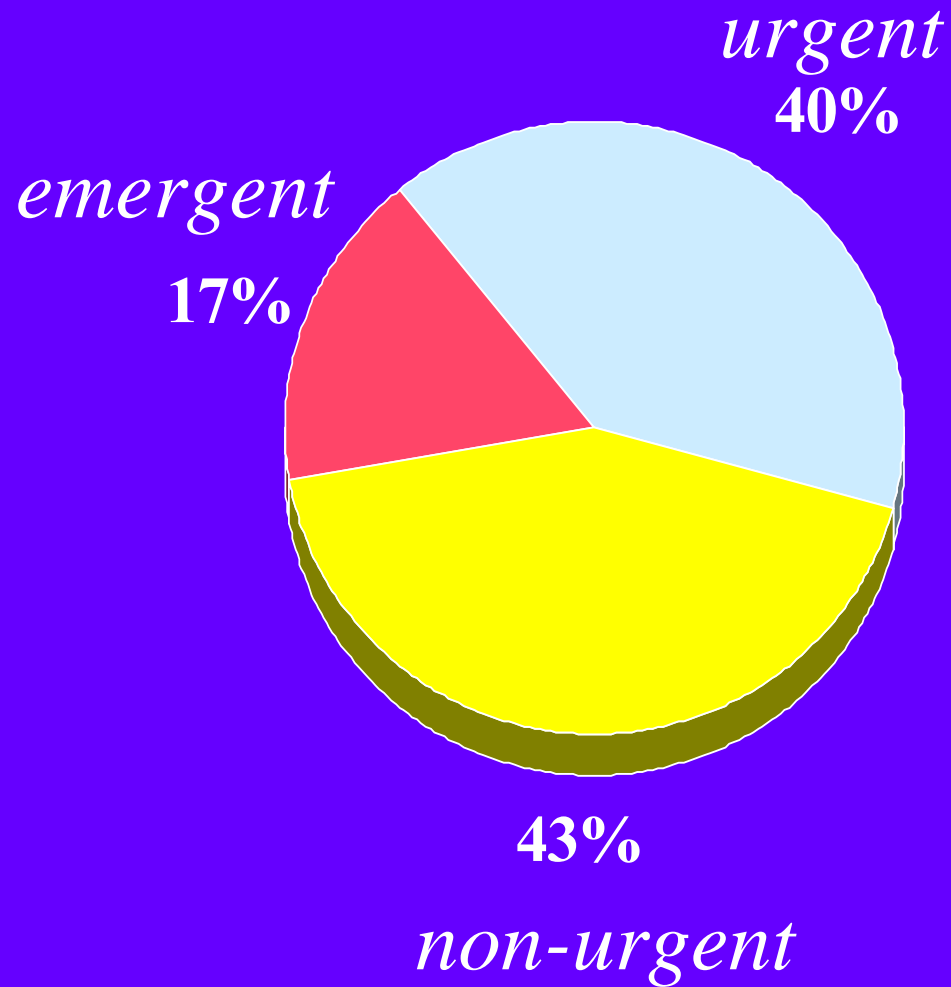




*Those in need of few resources but the doc-nurse team can bypass the main ED. The parallel processing of patients can occur – if patient categorization is done reliably.*

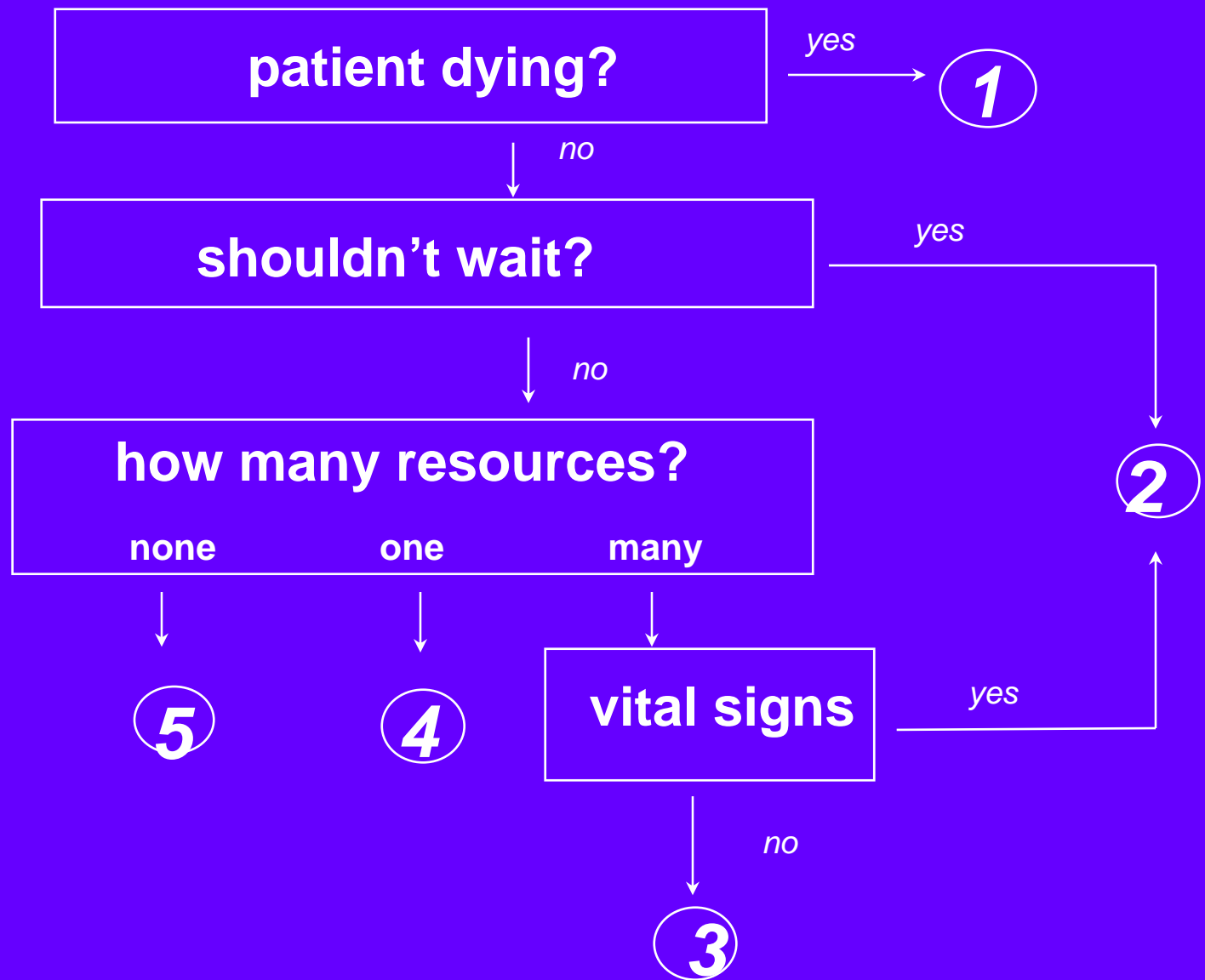
# The Bad News...

U.S. GAO, 1993



# The ESI<sup>©</sup> 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 vitals'
- 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”: Wuerz, Milne, Eitel, Travers, and Gilboy: AEM 2000;7(3): 236-42**

# Reliability and Validity of a New Five-Level Triage Instrument:

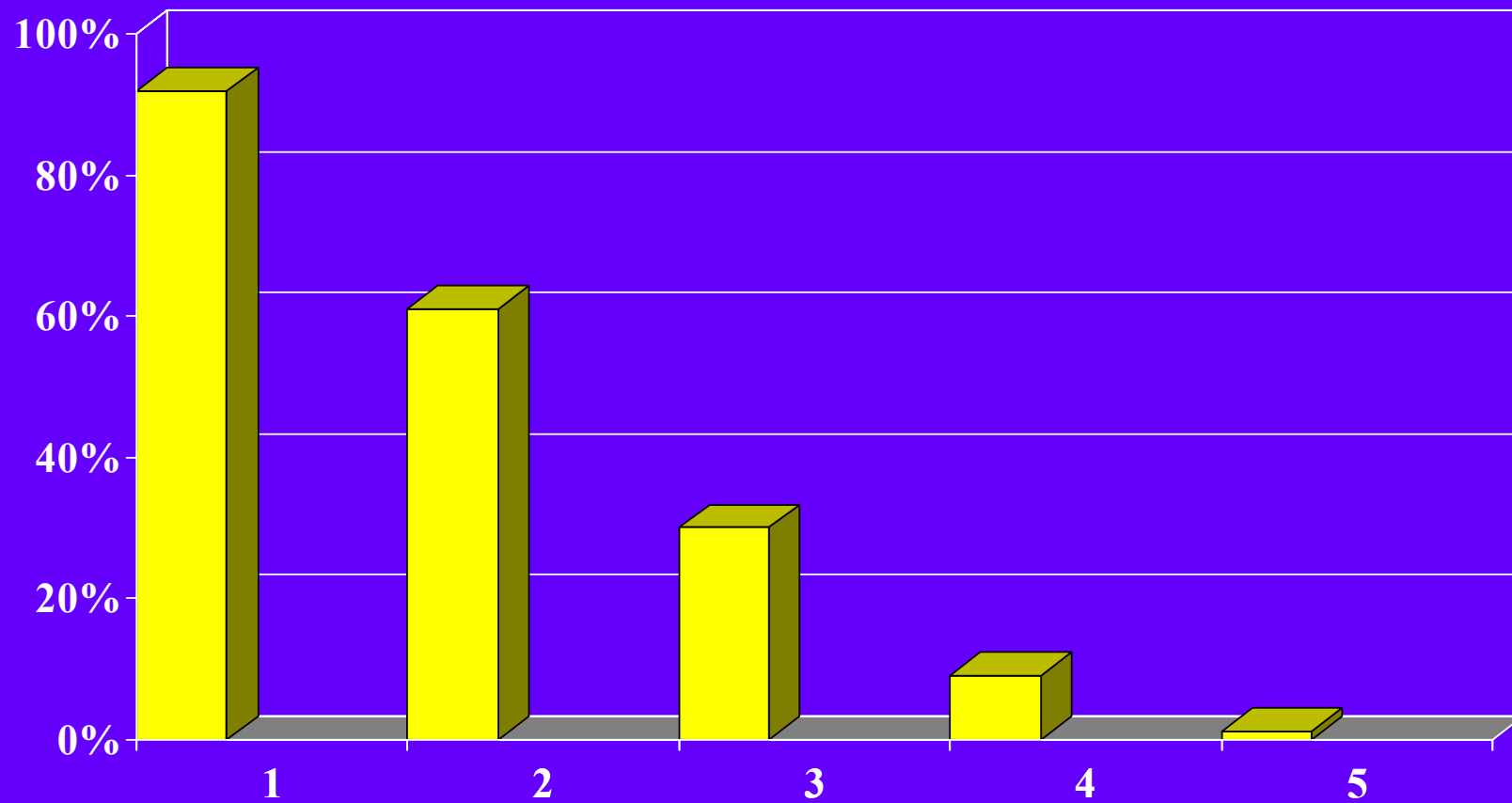
## AEM March 2000

		Nurse-prospective				
		1	2	3	4	5
Physician-retrospective	1	4	0	0	0	0
	2	2	84	12	1	0
	3	0	13	81	12	1
	4	0	0	5	66	22
	5	0	0	1	10	37

**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

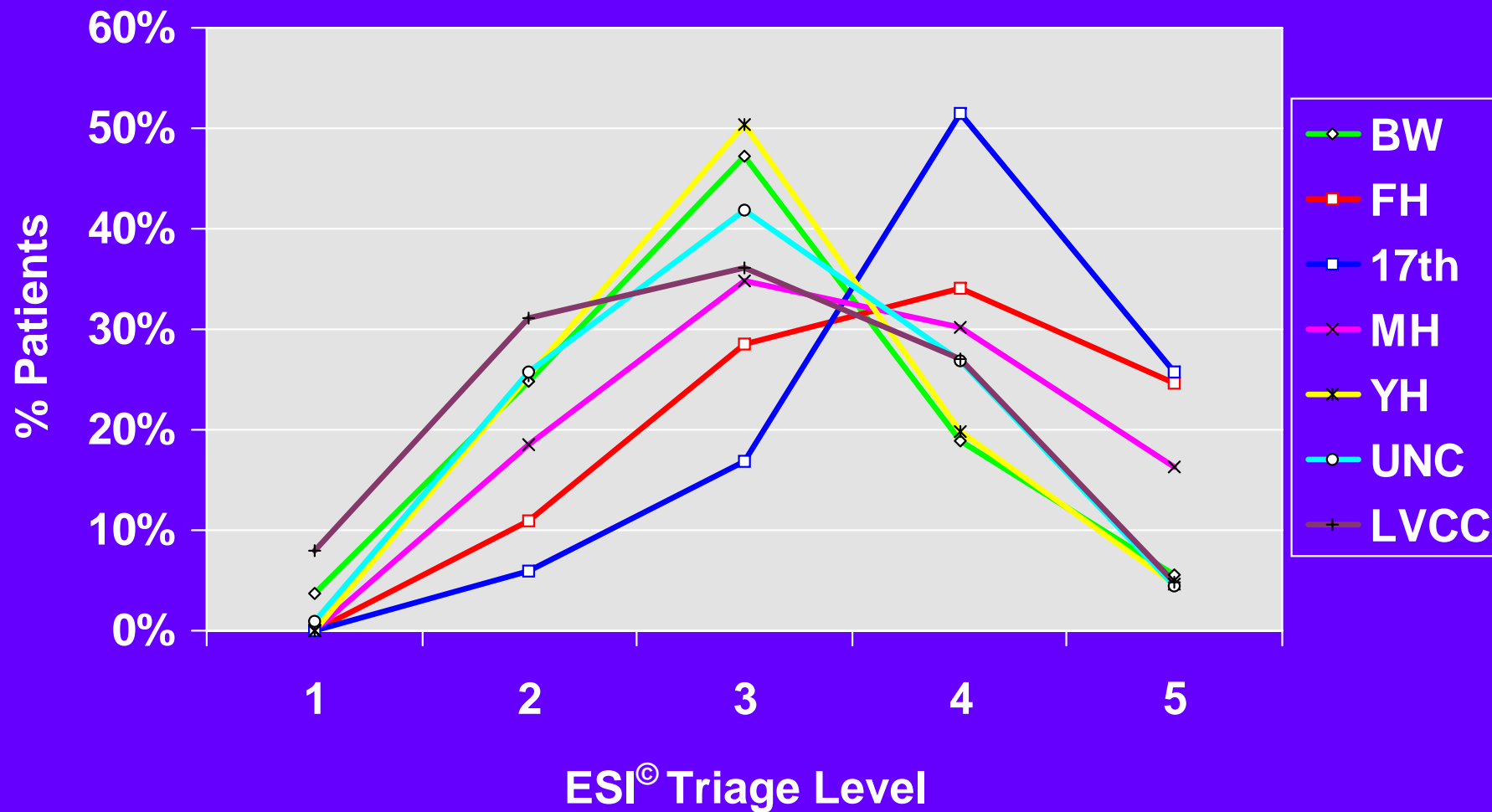
# ESI © v.2: All-Age 1999

- 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:**

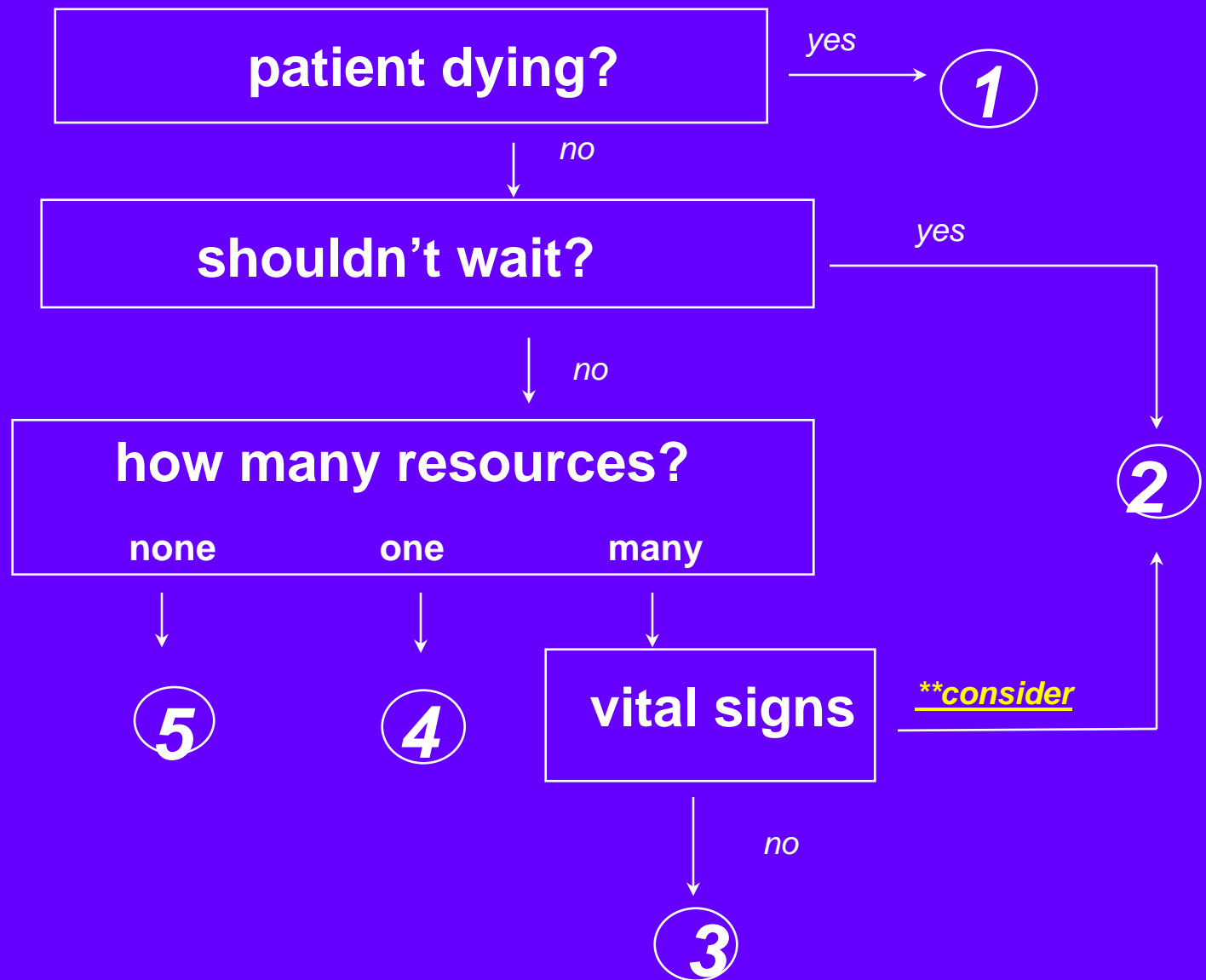
**Eitel D, Travers D, Rosenau A, Gilboy N, Wuerz R.  
The Emergency Severity Index Triage Algorithm  
Version 2 is Reliable and Valid. Academic Emergency  
Medicine. 2003; 10(10) 1070-1080.**

# Case Mix by Site



# **ESI TRIAGE DEVELOPMENT**

**Version 2 vs. 3**



# **ESI TRIAGE v.3 DISTRIBUTION**

## **ENA Handbook**

**The Emergency Severity Index Implementation  
Handbook: A Five-Level Triage System/  
authored by: Nicki Gilboy, Paula Tanabe,  
Debbie A. Travers, Alex Rosenau, and David  
Eitel – The Emergency Nurses Association  
[ENA] DesPlaines, IL: 2003**

**Contains ESI v.3 (*consider*)**

**THIS IS NO LONGER AVAILABLE FROM THE ENA**

**ESI v.4 IS OUT & WITH A NEW PUBLISHER**

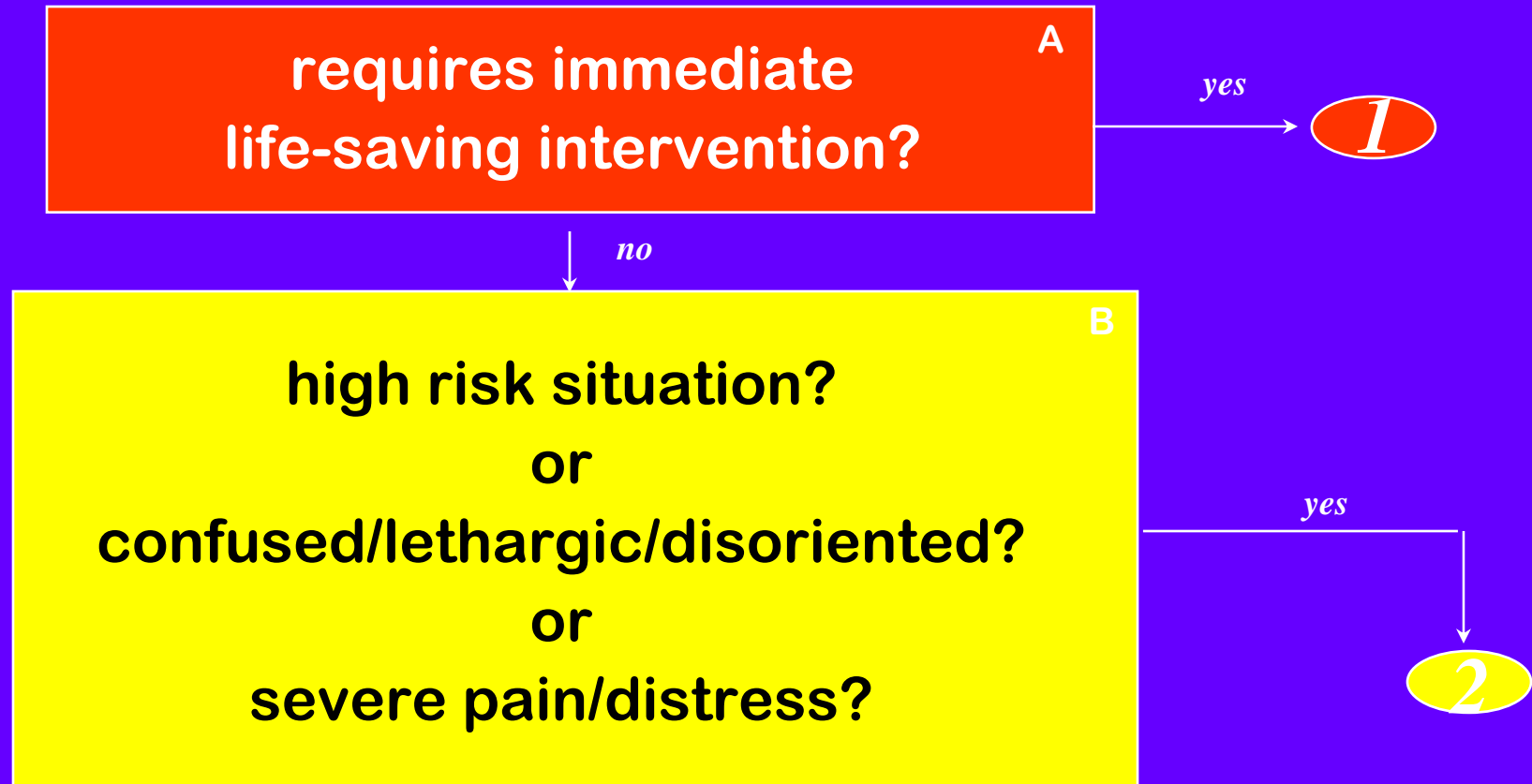
# **ESI TRIAGE:**

**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



# 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

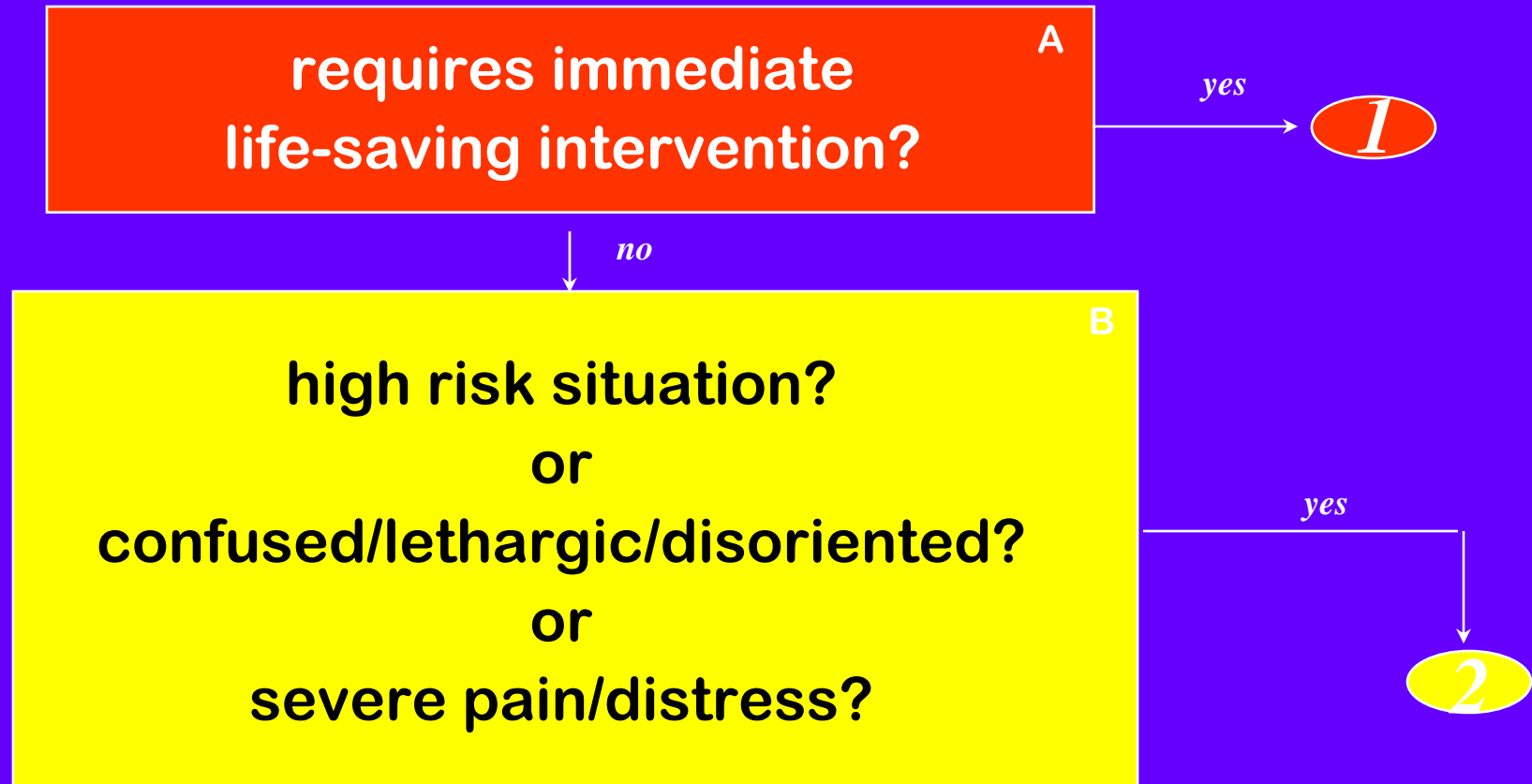
# What Can You Do With ESI Triage?

*“The job of management is prediction.”*

Dr. Deming

**Reliability begets predictability**

# *ESI Triage Algorithm v.4*



# 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 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 more meaningful discussions with your administrator about your 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?

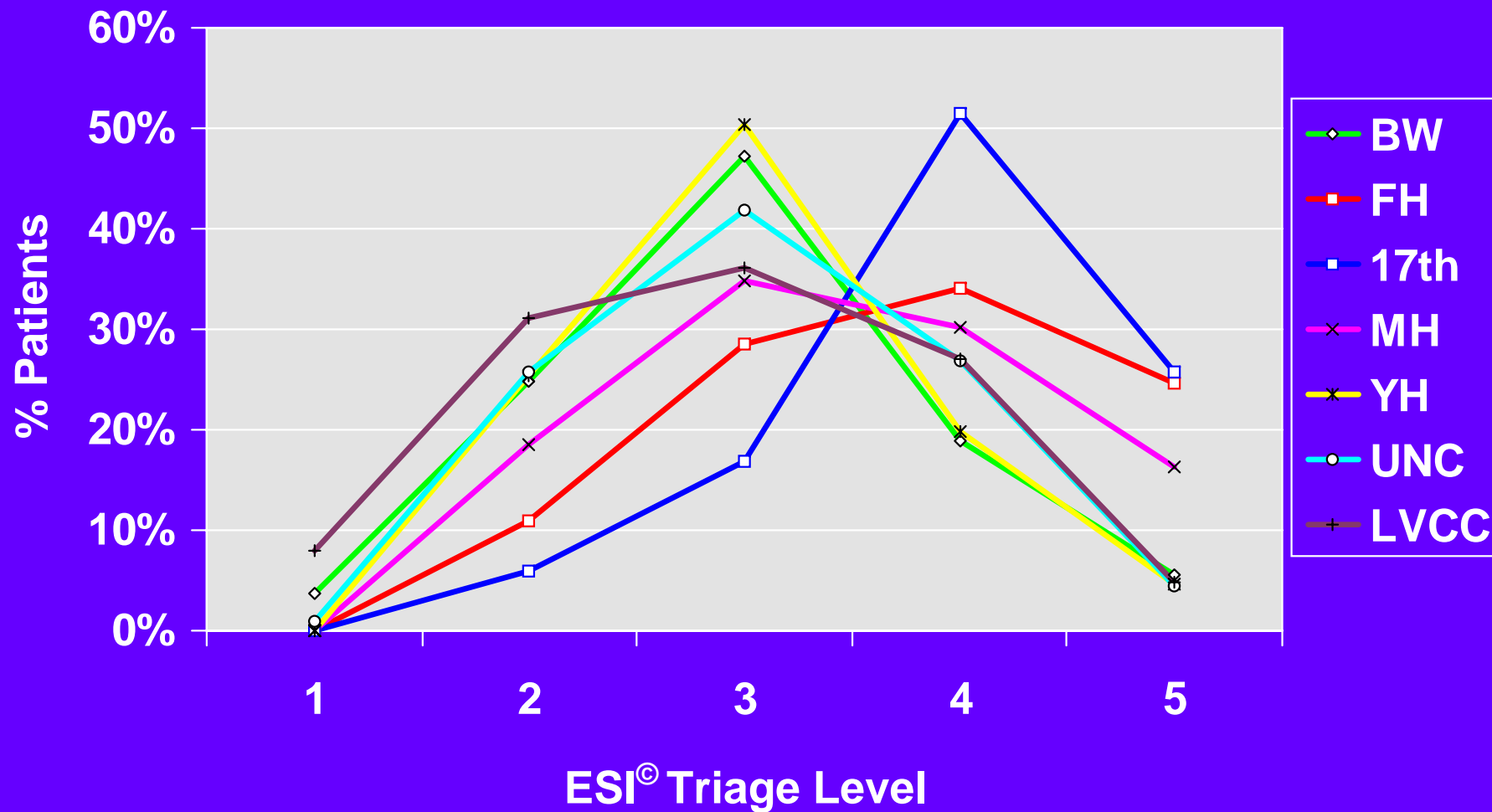
# **Physical Plant, Staffing and Staff Mix Decisions**

- **Say 40% of your ED's presentational case mix are 4's and 5's. How many 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 (or consulting mix) how might you think about staffing at each site if you had *reliable* ESI case mix data available to you across those ED's?
- Or, if you are a health planner how could *reliable* ED ESI case mix data help you?

# Case Mix by Site



# **Downstream Hospital Readiness**

**See next**

# Presentational Case Mix Data

(“can manage the waiting room...”)

Triage Level	Case Mix (% total)	Admit Rate	Resource Intensity	ED LOS (hours)
Level 1	125 (2%)	73%	80%	2.4
Level 2	1,756 <u>(22%)</u>	<u>54%</u>	90%	4.0
Level 3	3,173 (39%)	24%	73%	3.4
Level 4	2,197 (27%)	2%	47%	2.0
Level 5	812 (10%)	.003%	14%	1.4
<b>TOTAL</b>	<b>8,063</b>			

# Service Operations Management

## Precepts, Methods, and Tools

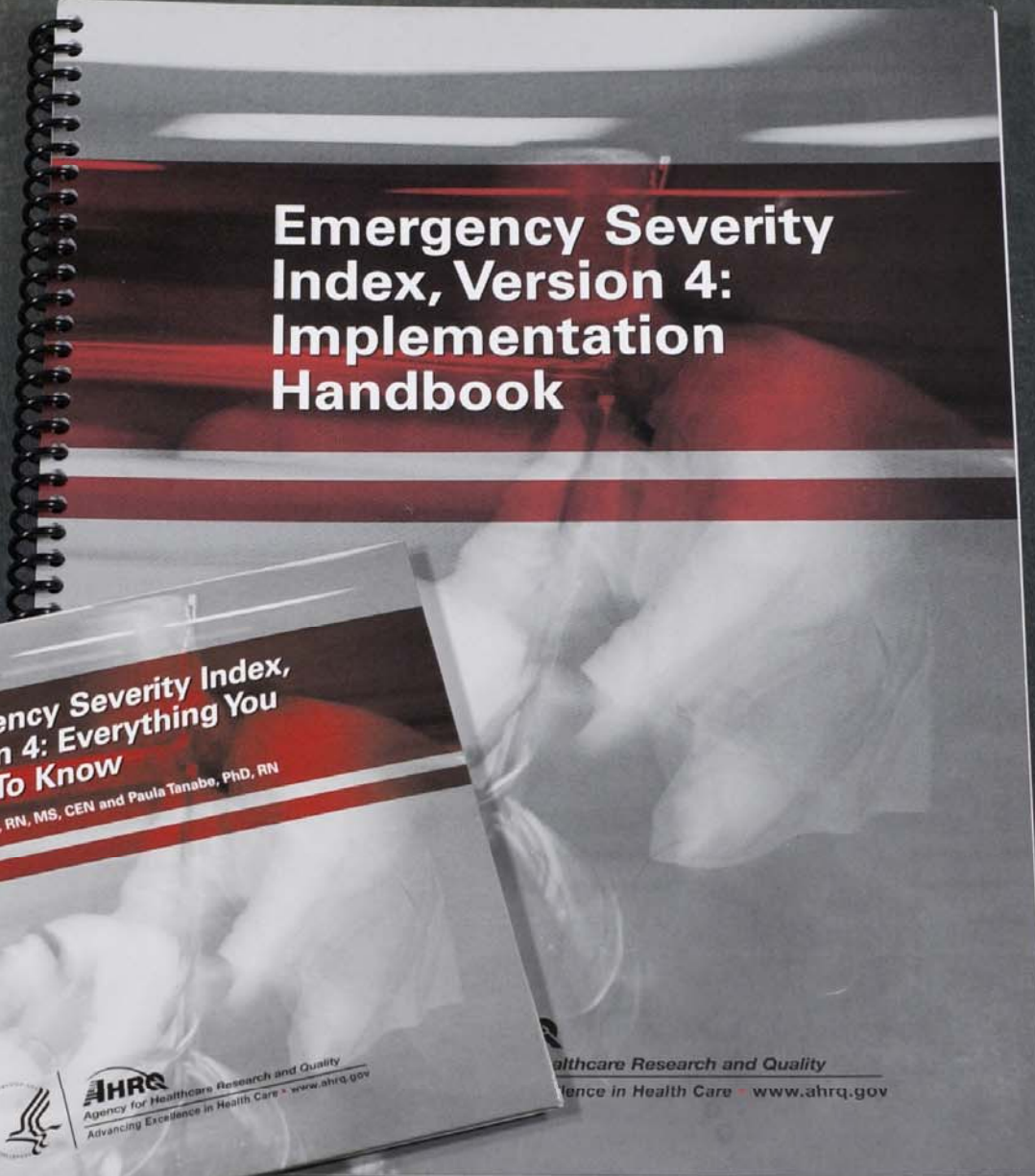
With ESI case mix data, *some* now available:

- Statistical forecasting and demand analysis
- Capacity to serve planning
- Workflow diagramming (ED mapping)
- Optimize staff scheduling (rostering)
- Lean and Six Sigma business improvement
- Dynamic Modeling: Simulation Modeling

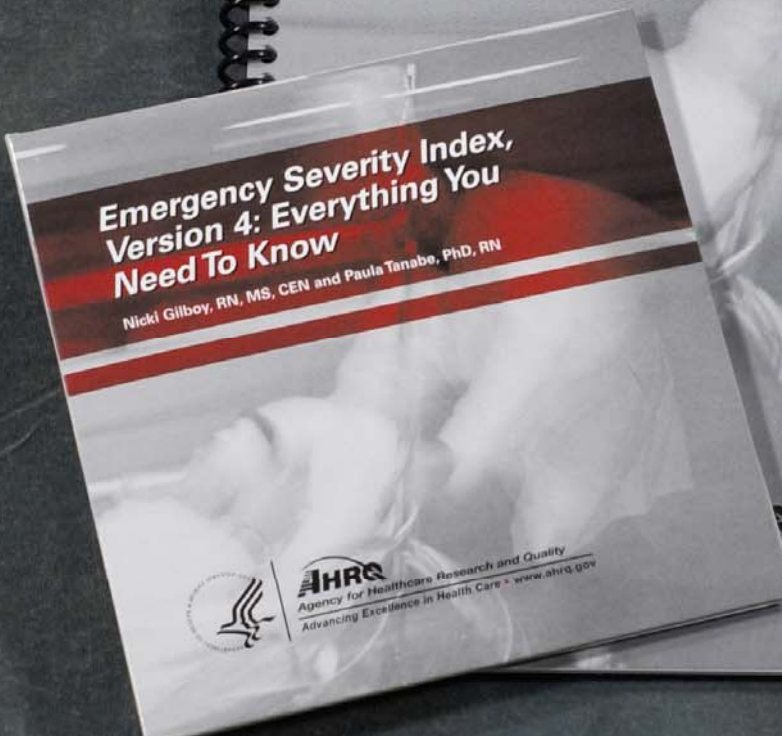
# **How Can You Get ESI v.4 Triage?**

✓ **Implementation Handbook**

✓ **Training DVD**



# Emergency Severity Index, Version 4: Implementation Handbook



## Emergency Severity Index, Version 4: Everything You Need To Know

Nicki Gilboy, RN, MS, CEN and Paula Tanabe, PhD, RN



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