ARTICLE:

- **Country:** USA
- **Funding Sources:** None specified

PURPOSE:

- **Research Question:** Does a triage-based trigger system for abnormal vital signs decrease the time to physician evaluation and to therapeutic intervention, and disposition in emergency department (ED) patients.

DESIGN:

- **Study Design:** Retrospective chart review
- **Dependent / outcome Variable(s):** Time to physician evaluation and to therapeutic intervention, antibiotics, and disposition
- **Independent / research Variable:** Implementation of a triage-based “trigger” system based on abnormal vital signs.

SETTING / SUBJECTS:

- **Research Setting:** >50,000 visit per year ED in a tertiary care center in Boston, MA
- **Subjects:**
  - **Study population:** Eligible: 1) adult patients age 18 or older, 2) presented during one of the 5-day periods arbitrarily selected for inclusion, and 3) met any one of the predefined triggers vital signs.
  - **Inclusion / Exclusion criteria:** Trauma activations, code strokes, or having an acute ST-segment elevation myocardial infarction
  - **Number (control / intervention groups):** 71 patients in the pretrigger study period and 79 patients in the posttrigger study period
  - **Demographics:** Demographically similar (Table 2); approximately 60% female and aged 60 years old.
  - **Attrition:** None, as this was a retrospective chart review. Approximately 2100 charts from each period reviewed.

METHODS:
• **Interventions**: Trigger system based on abnormal vital signs → overhead page of “trigger to room ___” with the expectation that an ED attending physician, senior and junior ED residents, ED nurse, and technician report to the room immediately.

• **Study Groups**: Pre-trigger patients (5 random days in 2007) and post-trigger patients (5 random days in 2008).

• **Instruments**: Triggers were: HR <40 or >130 bpm; RR <8 or >30 resp/min respirations/min, blood pressure of <90 mm Hg, or an oxygen saturation of <90% on room air; established based on prior data, in-hospital policies, and ED management consensus. Marked nursing concern was also a trigger but was not included in analysis due to difficulty of standardization.

• **Data Collection**: A single data abstractor was used, trained in data abstraction and management.

**DATA ANALYSIS:**
- **Level of Data**: Interval
- **Statistics Used**: Wilcoxon rank sum test because medians were used.
- **What, if any, variables were controlled for?**: No

**RESULTS:**
- **Brief answers to research questions**: A triage-based trigger system for abnormal vital signs DOES decrease the time to physician evaluation; initial therapeutic intervention and antibiotic; in emergency department (ED) patients. Did not decrease time to disposition. Not mentioned whether time was decreased for other interventions (analgesia, blood, cardiac medications or electricity, mood stabilizers, vasopressors, respiratory support), but these were initially defined as “therapeutic interventions.”
- **Additional findings**: None
- **Other possible explanation for findings**: Other possible explanations included changes in patient volume (it increased); operational changes (none); staffing (no changes); siphoning of resources from other patients (however, length of stay did not increase).
- **Limitations**: This was retrospective data, so limitations included incomplete data, limited ability to control for confounders, Hawthorne effect (but physicians did not know study was occurring); not including marked nursing concern; timing measurements (based on electronic time stamps); possibility that throughput times of all patients increased during this period (however, no operational changes made making this less likely). No final outcomes assessed.

**IMPLICATIONS FOR PRACTICE:**
- **Applicable to this clinical practice**: Probably; large tertiary care ED.
- **Feasible (cost, resources, etc)**: They estimated that their trigger patients comprised 3% of their entire patient population, adding about 4 overhead pages per day. We already have an overhead paging system in place and use the standard GAO ESI (Emergency Severity Index). Most of our patients who would meet those trigger requirements probably already go into critical care bays. It
would have to be studied at MMC how many extra patients this system would catch and whether it would be operationally feasible to have the attending, senior, junior, nurse and tech meet that patient in a room.

- **Clinically Relevant:** It is unclear whether this is clinically relevant. This was a small study and no clinically relevant outcomes were assessed (such as decreased hospital length of stay, decreased complications, neurologic outcomes, decreased morbidity or mortality).

**LEVEL OF EVIDENCE / DECISION FOR USE:**

- x Background  Consider Replication  Ready for use

**Level of Evidence:**

- Ia Evidence obtained from meta-analysis of randomized controlled trials
- Ib Evidence obtained from at least one RCT
- IIa Evidence obtained from at least one well-designed controlled study without randomization
- x IIb Evidence obtained from at least one other type of well-designed quasi-experimental study
- III Well-designed non-experimental studies
- IV Expert committee reports, opinions of experts