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SYSTEMATIC REVIEW

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# Effective strategies for reducing patient length of stay in the emergency department: a systematic review and meta-analysis

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## Abstract

**Background** Overcrowding is a common issue in emergency departments worldwide. One condition associated with overcrowding is the Emergency Department Length of Stay(EDLOS). Prolonged EDLOS is linked to increased hospitalization costs, worsening clinical outcomes, and deterioration in patient-reported outcomes. Consequently, there is a need to reduce EDLOS, and the scientific literature reports multiple strategies aimed at this goal. Therefore, the objective of this study was to determine strategies statistically significant in reducing the EDLOS.

**Method** A systematic search was conducted in PubMed, Scopus, the Latin American and Caribbean Health Sciences Literature (LILACS) database, and Google Scholar from January 2000 to January 2024. Studies that included patient care strategies in emergency departments to reduce EDLOS, in adults or pediatric populations, and observational or experimental studies were included. The quality of the studies was assessed using the Cochrane Collaboration's Risk of Bias tool for Interventional Studies, and the certainty of the evidence was evaluated using the Grading of Recommendations Assessment, Development, and Evaluation criteria. A mean difference analysis in minutes was performed using a random-effects model.

**Results** A total of 3410 studies were identified using the search strategy with a total of 245,404 patients were analyzed. Three types of strategies were identified with results in reducing EDLOS. Interventions performed by physicians in the triage area (liaison, supervision, and advanced triage) showed a significant reduction of -21.87 min (95% CI -28.35; -15.38). The second intervention was the use of Point-of-Care Testing, which showed a reduction of -41.98 min (95% CI -98.13; 14.15). The third intervention was the creation of fast-track strategies, which documented a reduction of -21.81 min (95% CI -41.79; -1.83). Most of the studies were of the before-and-after type. The certainty of the evidence for the first intervention was moderate, while for the other two groups, it was considered low.

**Conclusion** The presence of a physician in the triage team demonstrated a reduction in patient EDLOS, although with high heterogeneity among the analyzed studies. Similarly, the use of fast-track strategies is also significantly useful in reducing EDLOS, while POCT reduces EDLOS but not significantly.

**Keywords** Emergency services, Length of stay, Triage, Fast-track, POCT

## Background

Overcrowding is a situation in which the function of an emergency department is compromised due to an excessive number of patients waiting for care attention. This can include consultations, diagnoses, treatments, referrals, or discharges, and exceeds the operational capacity of the service [1]. The Emergency Department Length

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of Stay (EDLOS) is a condition associated with the overcrowding of emergency services and refers to the total duration of stay (LOS) of patients in the emergency department (ED) [2].

Boarding is defined as the time patients with a hospitalization order spend waiting to be assigned a bed within the hospital [3]. Emergency services are considered congested when there are more than 10% of boarders [3]. Thus, the patient's length of stay in the ED is often associated with boarding time. Consequently, an increase in boarding time inevitably leads to a higher number of patients in the ED, causing overcrowding. However, not only is the increase in EDLOS associated with overcrowding, but it is also linked to the worsening of clinical outcomes [4], poor outcomes reported by patients [5], and the increase in total hospitalization costs [6].

Based on this statement, there is a need to reduce EDLOS and decrease overcrowding. It is crucial to identify effective strategies for reducing patient stay times in the ED, as finding effective methods could significantly reduce overcrowding. Although many of these strategies are described in the literature, it is not entirely clear which ones are useful for reducing EDLOS. This study aimed to address the PICO question: Among all the strategies reported in the literature, which ones demonstrate a significant reduction in EDLOS for patients visiting the emergency room, regardless of the cause? Therefore, the objective of this work is to identify which strategies published in the literature are statistically significant in reducing the length of stay for patients in the emergency department.

## Methods

This study was conducted following the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The study was registered in the PROSPERO database with the number CRD42024535667 and approved by the Research Ethics Committee of the Fundación Santa Fe de Bogotá with the number CCEI-16415–2024.

A systematic search was conducted in PubMed, Scopus, and the Latin American and Caribbean Health Sciences Literature (LILACS) database. Additionally, Google Scholar was reviewed to include references from January 2000 to January 2024. (Supplementary File 1).

### Inclusion criteria

Studies that included patient care strategies in emergency departments aimed at reducing EDLOS were considered. This included studies on adult or pediatric populations, both observational and experimental, published between the years 2000 and 2024, with no language restrictions.

### Exclusion criteria

Narrative review studies, studies with only an abstract available, and studies with incomplete data despite searching supplementary material and communicating with the authors were excluded. The primary outcome was the reduction of EDLOS with strategies applied in the emergency department.

Three researchers independently assessed the eligibility of the studies based on the criteria. All abstracts that met the initial criteria were reviewed as full manuscripts. Studies that met the eligibility criteria in the full-text review were included in the final data analysis. Any discrepancies were resolved by consensus among the reviewers.

### Data collection and processing

The study data were extracted by the reviewer following the inclusion criteria. The data obtained from the review were recorded in lists in txt format and subsequently analyzed using the statistical program Rayyan (Rayyan Systems Inc. 2022). When data were not available, attempts were made to contact the study authors directly to obtain additional information. The titles and abstracts of the articles were included in the Rayyan statistical program. Each author independently reviewed the abstracts, and only the articles included by the researchers for review were considered. In cases of discrepancies, these were resolved by consensus among the three authors. Once all the abstracts to be included were defined, the selected articles were reviewed in full text for analysis. Additionally, the following information was summarized in a pre-designed database: the first author's last name, year of publication, country of the study, study population size, type of study, intervention or strategy used, and outcomes (Supplementary File 2).

### Quality assessment

The quality of the studies was evaluated using the Cochrane Collaboration's Risk of Bias tool for Interventions (ROBINS-I) [7]. In cases of discrepancies, the articles were reviewed by the researchers, and a consensus was reached among all to determine the inclusion or exclusion of the study. The certainty of the evidence was assessed using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) criteria [8].

### Data analysis

All statistical analyses were performed using version 4.2.0 of the R-CRAN project (R Core Team [2009–2021]. R Foundation for Statistical Computing, Vienna,

Austria. URL: https://www.R-project.org/). The R packages "mada", "meta", "metafor", and "rmeta" were utilized.

A mean difference analysis (in minutes) was conducted using a random effects model. Additionally, Cochran's Q and Higgins' $I^2$ values were used to evaluate heterogeneity, with significance considered at $p<0.1$ and $I^2>50\%$. To explain the heterogeneity among studies, a sensitivity analysis was also performed. Finally, a publication bias analysis was planned to use a funnel plot, and Peters' regression test was conducted to assess small-study bias.

## Results

A total of 3410 studies were identified using the search strategy. In PUBMED, 1670 studies were identified, Scopus showed 1737 studies, and LILACS showed three studies. In Google Scholar, 7660 studies were documented, and the first 200 to 250 studies were reviewed following the recommendation of Bramer et al. [9]. After removing duplicates, a total of 99 abstracts were reviewed, of which 79 were selected for full-text reading. A total of six articles could not be analyzed due to incomplete data and the inability to contact the authors. Finally, an analysis of 20 studies was conducted (Fig. 1).

### Description of the studies

After the search, a total of twenty studies were included. Various strategies for reducing EDLOS were reported. The research team decided to categorize these strategies into three groups of interventions. The first group included all interventions conducted in the triage area. The second group comprised studies utilizing point-of-care testing (POCT) tools. The last group included strategies for evaluating fast-track areas. The research team decided to exclude two studies from the analysis because the reported interventions could not be associated with other interventions. The first excluded study was the work of Fan et al. [10], in which the effect of a nurse requesting radiography from triage was described but no significant difference in LOS was documented. The other excluded study was that of Bucheli et [11], in this study, a non-significant decrease in LOS was demonstrated with the increase in care staff.

Studies into the interventions group triage (Soremekun A, et al. [12], Traub et al. [13], White et al. [14], Chan et al. [15], Han et al. [16], Imperato et al. [17], Nestler et al. [18], Nestler et al. [19], Rogg et al. [20], Brian Holroyd et al. [21] included actions such as physicians supervising triage, performing advanced triage interventions, and supporting triage performed by nursing staff (Table 1). In studies that included POCT-type interventions (Singer et al. [22], Singer et al. [23], Jang et al. [24], Kankaanpää et al. [25], Kendall et al. [26], Singer et al. [27] most of them show the usefulness of the use of cardiac markers for rapid diagnosis at the bedside of patients, but also some POCT metabolic tests were used (Table 1). Finally, in the third group, studies were included that showed the usefulness of the creation of areas of fast track (Sanchez

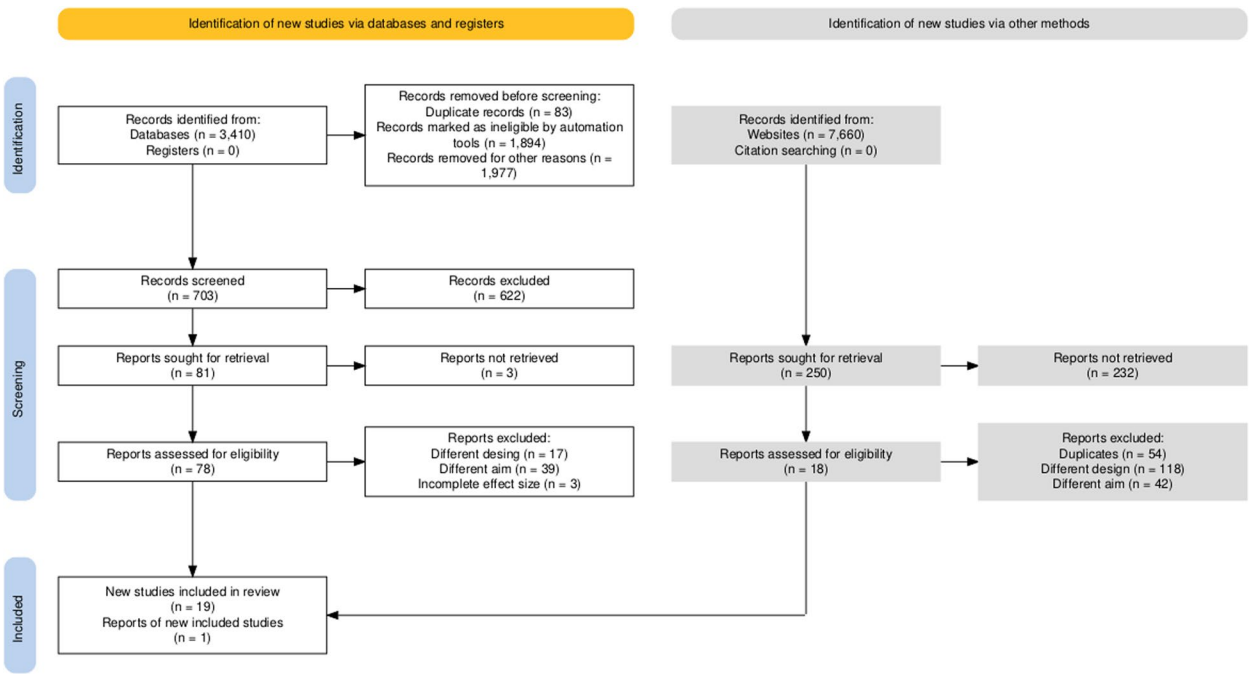


**Fig. 1** PRISMA

**Table 1** Article summary

| Study/ country | Year | Type of study | Inclusion criteria | Exclusion criteria | N/Age/Sex | Outcome | Statistical value |
|---|---|---|---|---|---|---|---|
| **Soremekub A, et al.** [12]**. U.S** | 2012 | Retrospective physician triage, Intervention before and after | Patients who arrived between 11 am and 11 pm<br>Patients of medium complexity | High complexity and low complexity patient | 76.858, 44(24), 48.8%Male | LOS decreased from 374 (244–559) to 348 (219–530) minutes | Decrease: -26 min (21–29) |
| **Traub SJ, et al.** [13] **U.S** | 2015 | Retrospective physician triage, intervention before and after | Patients who could wait to be treated (10:00 a.m.–10:00 p.m.) | Not reported | 2.919, 62(20.9), 47.6% Male | LOS decreased from 297.8 (233.9) to 261.7 (151.9) minutes | *P*: < 0.0001 |
| **White BA, et al.** [14]**. U.S** | 2012 | Retrospective physician triage, intervention before and after | All patients admitted to the emergency department | Early triage assessment by physician for initiation of timely interventions | 20,419, 47(26–65), 50.9%Male | Patients admitted: Pre LOS 431 (288–632), Post 400 (264–595)<br>Patients discharged: Pre 318 (210–478)<br>Post 295 (187–451) | *P*: < 0.001 |
| **Fan J, et al.** [10] **Canada** | 2006 | Prospective, controlled clinical trial<br>Nurse orders X-ray | Patients with ankle or foot twisting trauma | Neurovascular compromise, deformity or open fracture | 124,34.6(± 14.3), 55.6%Male | LOS decreased from 70.0 (44.8–109.8) to 65.0 (49.0–93.0) | *P*: 0.421 |
| **Sanchez M et al.** [28] **Spain** | 2006 | Retrospective, intervention in fast track areas for patients who require a medium level of care | Non-urgent patients are subgrouped as appropriate for Fast Track | Patients requiring urgent care | 730,41(± 1.63), NR | LOS decreased from 285 (45) minutes) to 258 (40) minutes | Difference of -28 (-31 to -23) min<br>*P*: < 0.001 |
| **Chan T.C, et al.** [15] **U.S** | 2005 | Prospective intervention in triage | All patients admitted to the emergency room | | 6.087,NR, NR | Decrease in 31 min (95% CI 6–57) before and after<br>Discharged group decreased in 35 min [95% CI 11–59)<br>Admitted group decreased from 11 minutes (95% CI 5–27) | Not reported |
| **Jin H. Han et al.** [16] **U.S** | 2007 | Retrospective study—pre and post physician triage | Patients entering triage in the pre- and post-medical period from May 11 to July 10, 2005 | Not reported | 17.265, 40.9(± 18.2), 43.9%Male | LOS PRE: 266 min (150–424) POST: 255 min (138–407) | $p < 0.001$ |
| **Jason Imperato et al.** [17] **U.S** | 2012 | Retrospective study of intervention analysis—pre and post c physician in triage | Patients who enter triage in the pre- and post- physician period on July 1, 2008 for 3 months | Not reported | 17.631, NR, NR | Admitted control 2584 patients 321 min (IQR 238–424) PIT: 2453 patients 297 min (IQR 223–395) 0:24 ($p < 0.001$)<br>Not admitted control: 6,036 patients 197 (IQR 137–288) PIT: 6558 patients 190 (IQR 127–284) 0:07 ($p < 0.001$) | Admitted: ($p < 0.001$) Not admitted: ($p < 0.001$) |

**Table 1** (continued)

| Study/ country | Year | Type of study | Inclusion criteria | Exclusion criteria | N/Age/Sex | Outcome | Statistical value |
|---|---|---|---|---|---|---|---|
| **Nestler DM et al.** [18] **U.S** | 2012 | Physician triage intervention pilot before and after | Patients seen from April to June 2011 with ESI level 3,4 and 5 during the pilot hours | Pediatric patients, ESI 1 and 2 patients, psychiatric patients | 724, 53.9(±21), 42%Male | Total, LOS: before: 270 min (IQR 187–372), Intervention: 229 (IQR 168–303) | $p < 0.001$ |
| **Nestler DM et al.** [19] **U.S** | 2014 | Intervention before and after physician triage | Patients seen from July to August 2011 with ESI level 3,4 and 5 | Pediatric patients, ESI 1 and 2 patients, psychiatric patients | 1.280,49(31–66), 46%Male | Total, LOS: before: 253 min (IQR 175—365), After: 273 (IQR 176–384) | $p < 0.20$ |
| **Rogg JG et al.** [20] **U.S** | 2013 | Retrospective study Intervention physician triage | Patients admitted to the emergency department between December, 2006 and November, 2010 | Patients directed directly to the fast track section, resuscitation, or psychiatric service | 81,855, 43(24–61), 49%Male | Total LOS: Before: 362 (IQR 234–544), After: 342 (IQR 216–524) | $p < 0.0001$ |
| **Bucheli, B. et al.** [11] **Switzerland** | 2004 | Prospective intervention study, more staff | All patients admitted to the emergency department for 3 weeks | Not reported | 360,54(±21), 50%Male | LOS control 230 ± 99 59 LOS intervention 226 ± 92 | N.S |
| **Singer, A. et al.** [27] **U.S** | 2005 | Prospective POCT Study | Patients over 24 years of age, non-traumatic chest pain, for 1 month. Patients admitted for study | Patients with diagnosed STEMI, outpatients | 366, 60.8(16.9), 57.5%Male | LOS intervention: 312 min; IQ 276 -348 min, usual: 426 min; IQ 396—462 min, mean LOS: 114 min (IQ 66-162 min) | *P*: < 0.05 |
| **Brian R. et al.** [21] **Canada** | 2007 | Randomized clinical trial: new design of medical vs conventional appointment | All patients over 17 years of age seen in the emergency department | Pediatric patients | 5.733,46(±21), 52%Male | LOS: before: 297 min (IQR 158 -561), after: 261 min (IQR 140 -516) | Not reported |
| **Singer A et al.** [22] **U.S** | 2015 | Before and after intervention study, POCT | All patients admitted to a critical care bed between April and June 2014 | Patients who do not meet inclusion criteria | 2.386, 60(43–75), 51%Male | LOS before 291 (170–473). LOS after intervention 294 (173–469) | *P*:0.84 |
| **Singer A et al.** [23] **U.S** | 2018 | Prospective, before and after intervention study, POCT | Stable patients with one of the eight complaints (Chest pain, generalized weakness, gastrointestinal problems) bleeding, missed dialysis, suspected infection or sepsis, women with abdominal pain aged 18 to 45 years and patients over 65 years of age with abdominal pain or syncope) | Patients requiring urgent or immediate evaluation in initial triage | 104, 55(19), 40%Male | ED length of stay was similar in study patients and controls (9.6, 95% CI 7.9–14.5 vs. 12.5, 8.2–21.2 h, respectively; $p = 0.15$) | *P*:0.15 |

**Table 1** (continued)

| Study/ country | Year | Type of study | Inclusion criteria | Exclusion criteria | N/Age/Sex | Outcome | Statistical value |
|---|---|---|---|---|---|---|---|
| **Jang J et al.** [24] **Korea** | 2013 | Controlled clinical trial, POCT | Patients over 15 years of age who are not critically ill | Critically ill patients, under 15 years of age, patients who did not receive a metabolic panel study | 10.244, 54.7(17.5), 47.9%Male | LOS: usual: 372 min (IQR 217–1,150), intervention: 350 min (IQR 206–1,002) | Not reported |
| **Kankaanpää M. et al.** [25] **Finland** | 2016 | Prospective observational study, before and after, POCT | Patients presenting to non-urgent ED who could wait for care | Patient with life-threatening pathologies, hospitalized patients, patients managed by qualified nurses only | 3.657, 43, 43%Male | LOS taking paraclinicals: phase 1 controls: 231 min (95% CI 218–244), phase 2 POCT model cases: 202 min (192–211) phase 3 EAT model: 185 min (179–192) –LOS not taken paraclinical: phase 1 controls: 139 min ( 131–147), phase 2 POCT model cases: 131 min ( 122–138) phase 3 EAT model: 123 min ( 118–127) | *P*: < 0.001 |
| **Considine J et al.** [29] **Australia** | 2008 | Intervention study (matched cases and controls), fast track | All patients admitted to the emergency department evaluated in triage | Not reported | 822, 24(36–74), 53%Male | LOS patients not admitted: usual: 132 min (IQR 83–205.25), intervention: 116 min (IQR 75.5–159.0)—LOS admitted: usual 313.51 min (171.0–485.0), intervention: 309.0 (192.5–435.0) | not admitted $p < 0.01$ – admitted p:0.89 |
| **Kendall J et al.** [26] **U.K** | 1998 | Randomized controlled clinical trial, POCT | Any blood sample taken in the emergency department | No exclusion criteria | 1.727 | LOS intervention: 188 min (181—194), Usual: 193 min (186—200) | *p*:0.30 |

et al. [28], Considine et al. [29] in the emergency room, the Considine study was divided into two outcomes, one for LOS changes in the admitted (a), and non-admitted (d) patient population (Table 1).

### Risk of bias

Figure 2 includes the risk of bias graph of the studies analyzed using the ROBINS-I tool [7]. In general, the articles had a moderate risk of bias, the main objections found by the research group were that many studies used specific times for the intervention, which could influence the type of patient and the availability of additional resources for the definition of patients (Fig. 2).

### Summary of results

In the first group, where the interventions carried out in the triage service of the emergency department by doctors, it was shown that after analyzing the ten included works, the triage interventions carried out by doctors decreased significantly the total times of stay in the emergency room, the effect size was -21.87, (95% CI -28.35; -15.38). However, a high heterogeneity was found between the studies $I^2$ of 89% (Fig. 3). In the second group, despite there being a trend towards reduction in EDLOS, with paraclinical taken at the bedside of the POCT patient, this reduction was not statistically significant with an effect size of -41.98 (CI 95% -98.13; 14.15), also with high heterogeneity between studies $I^2$ 97% (Fig. 4). Finally, the third group showed that using fast track strategy, the effect size was statistically significant for the reduction of EDLOS, -21.81 (95% CI -41.79; -1.83), with moderate heterogeneity but less than the other works $I^2$ 66% (Fig. 5).

Due to the high heterogeneity of the studies, it was decided to perform a sensitivity analysis, finding that by omitting the work of Chan et al. [15], the effect size does not vary much (-23.20 95% CI -30.07; -16.33) and although It reduces the heterogeneity a little, it is still high $I^2$ 83%. When other studies were omitted, no differences were found in the heterogeneity or in the size of the effect found (Supplementary File 3). Additionally, sensitivity analyzes were carried out for the groups of patients with POCT intervention. This analysis showed that by omitting the work of Singer et al. [27], heterogeneity was reduced by $I^2$ 79%. However, the effect size remained non-significant (Supplementary File 4). Interestingly, the sensitivity analysis of the fast-track studies

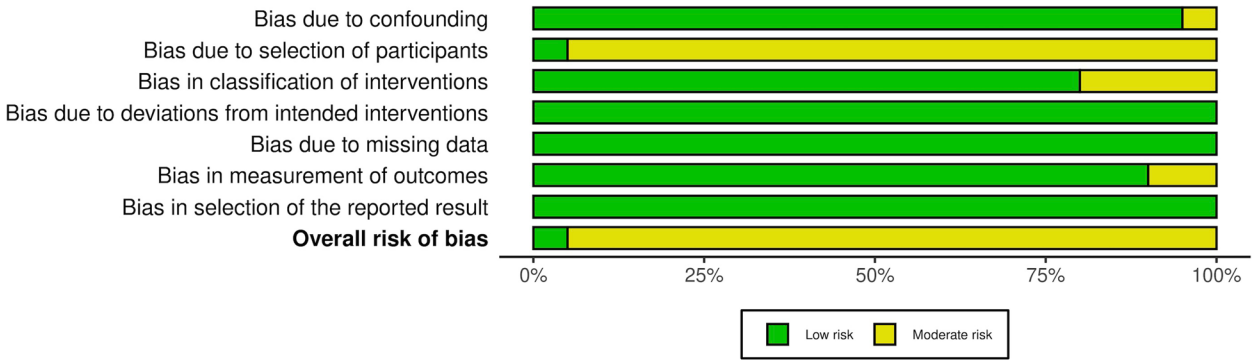


**Fig. 2** Robins I bias

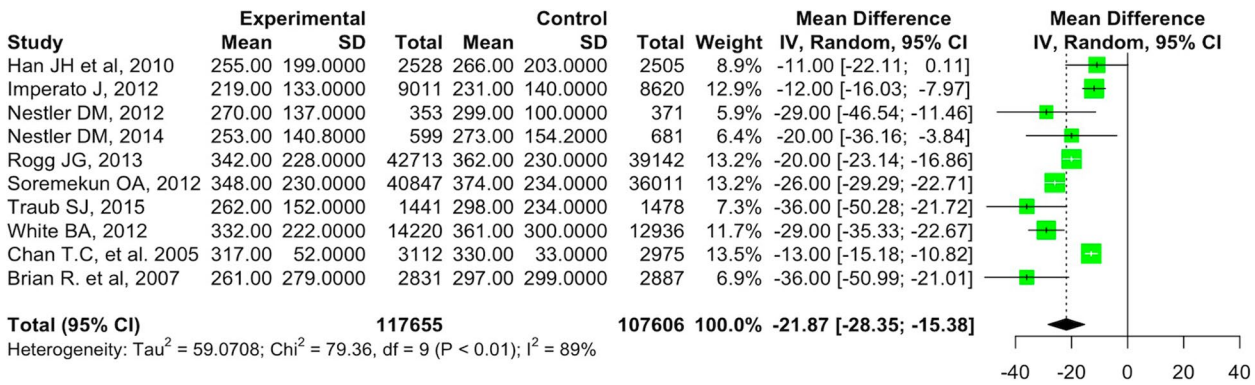


**Fig. 3** Forest plot for interventions in triage to reduce LOS, LOS: Length of Stay

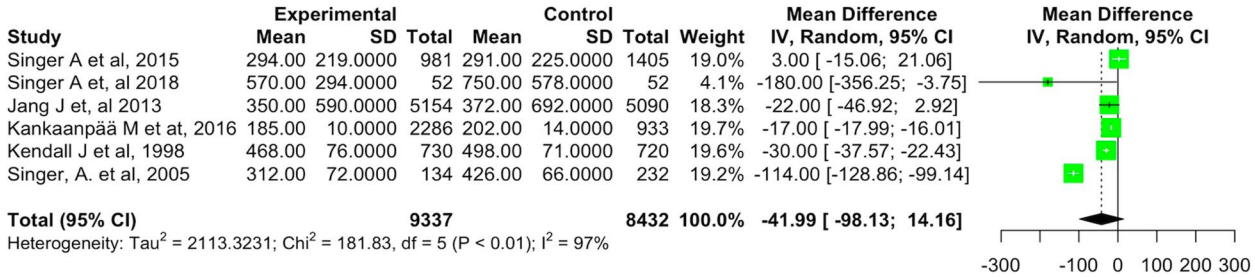


**Fig. 4** Forest plot for POCT strategy for LOS reduction, POCT: Point-of-Care Testing

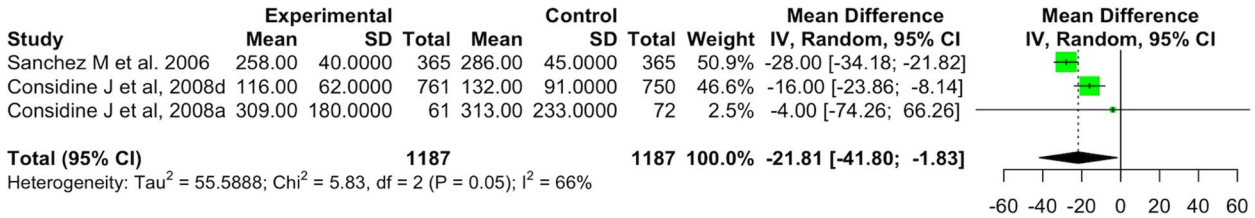


**Fig. 5** Forest plot for Fast Track strategy for LOS reduction, LOS: Length of Stay

showed that by omitting the cohort of patients derived from the study by Considine et al. [29]. The effect size was still significant, and heterogeneity was significantly reduced to $I^2$ 0% (Supplementary File 5).

### Bias reporting

To analyze the publication bias of the studies, a funnel plot was made to evaluate symmetry (Fig. 6). This graph shows symmetry in the studies making publication bias unlikely. However, a Peters regression test was carried out which showed a t value = -1.41 with $p = 0.1959$, suggesting that publication bias cannot be proven.

Additionally, a funnel plot was created for the POCT group, revealing asymmetry, which suggests the presence of publication bias (Supplementary File 6). The research team decided not to create funnel plots for the fast-track group, due to the few publications, making it more likely to encounter publication bias.

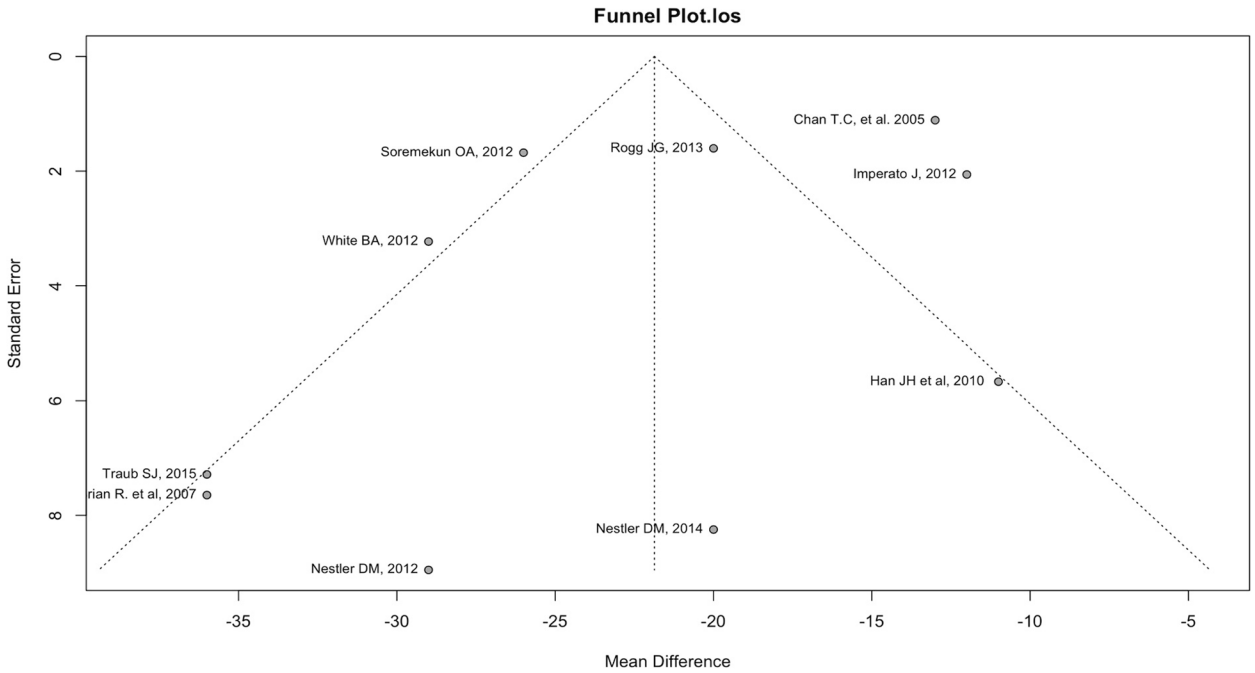


**Fig. 6** Funnel Plot for physician at triage and EDLOS, EDLOS: Emergency Department Length of Stay

### Certainty of the evidence

The certainty of the evidence analysis according to the GRADE system was moderate for the triage intervention studies and low for the other two recognized interventions (Fig. 7). This classification was primarily due to the approach samples were collected in most of the studies. No study implemented blinding in the intervention to be measured or in the control group. No difficulties were observed in reporting the test results. Unfortunately, the effect size of all outcomes was small, and only in two interventions was the effect size significant. However, all studies showed a directional trend toward the benefit of the interventions performed. Publication bias could only be ruled out for the first intervention; for the other interventions, this type of bias may have been present.

## Discussion

The objective of this systematic review and meta-analysis was to identify strategies that significantly demonstrated a reduction in EDLOS. Studies were recognized, where the aim was ambitious, focusing on measuring the reduction of overcrowding in emergency rooms. Given that our concept of emergency overcrowding results from multiple variables, we consider that studies should be conducted to demonstrate specific interventions for more targeted outcomes to reduce overcrowding. For this reason, the reduction of EDLOS was used as the primary outcome of our study. The results indicate that triage interventions contribute to EDLOS. These findings also were observed by an insightful systematic review that described multiple interventions to reduce overcrowding without measuring their actual effectiveness. Including, triage spaces for patients brought in by ambulances, triage support teams, and advanced triage interventions (such as ordering laboratory tests, and administering antibiotics, or analgesics) [30]. Another systematic review documented that triage interventions, such as experienced triage physicians, specialized triage teams, and triage liaison physicians, can contribute to reducing overcrowding [31]. This emphasizes that the triage area constitutes a critical site for implementing interventions that could translate into a reduction in overcrowding.

Our meta-analysis could complement the study by Benabbas et al. [32] which demonstrated a reduction in the mean difference of EDLOS by -31.31 min (95% CI: -46.75 to -15.83). Similarly, our findings showed a reduction of -21.87 min (95% CI: -28.35 to -15.38). Notably, our study included not only interventions involving a triage liaison physician but also incorporated other roles, such as advanced triage interventions.

Fast-track strategies were identified in this study as a potential option to reduce patient length of stay. Fast Track strategy was beneficial for patients admitted to the ED, rather than for those managed on an outpatient basis or referred elsewhere. These types of strategies were also reported in the systematic review by Sartini et al. [33] as a solution to ED overcrowding. This study found that point-of-care testing (POCT) at the patient's bedside can help reduce the patient length of stay in the ED. This finding is consistent with the results reported in the review by Rooney et al. [34].

We decided to exclude the effect of nurses performing interventions in the ED due to an insufficient number of studies meeting the inclusion criteria. However, it is important to highlight that, according to the work of Rowe et al. [35], the use of nurses to request diagnostic studies can also significantly contribute to the reduction of EDLOS.

## Conclusion

### Implications for practice

Based on the results of this study, the research team recommends that all ED should include at least one

**Interventions compared to No for LOS reduction**
**Bibliography:**

| Certainty assessment | | | | | | | Summary of findings | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Participants (studies) Follow-up | Risk of bias | Inconsistency | Indirectness | Imprecision | Publication bias | Overall certainty of evidence | Study event rates (%) | | Relative effect (95% CI) | Anticipated absolute effects | |
| | | | | | | | With No | With Interventions | | Risk with No | Risk difference with Interventions |
| **LOS reduction/MD triage** | | | | | | | | | | | |
| 225261 (10 non-randomised studies) | serious | not serious | not serious | not serious | none | ⨁⨁⨁◯ Moderate | 107606 | 117655 | - | 107606 | MD **21.87 SD lower** (28.35 lower to 15.38 lower) |
| **LOS reduction/POCT** | | | | | | | | | | | |
| 17769 (6 non-randomised studies) | serious | not serious | not serious | not serious | publication bias strongly suspected | ⨁⨁◯◯ Low | 8432 | 9337 | - | 8432 | MD **41.98 SD lower** (98.13 lower to 14.15 higher) |
| **LOS reduction/Fast-track** | | | | | | | | | | | |
| 2374 (2 non-randomised studies) | serious | not serious | not serious | not serious | publication bias strongly suspected | ⨁⨁◯◯ Low | 1187 | 1187 | - | 1187 | MD **21.81 SD lower** (41.79 lower to 1.83 lower) |

**CI:** confidence interval; **MD:** mean difference

**Fig. 7** GRADE evidence classification table, LOS: Length of Stay in Emergency Department

additional experienced physician, alongside the nursing team performing triage, to oversee, liaise, and conduct advanced triage interventions. This approach has been shown to significantly reduce patient length of stay in ED and contributes to alleviating overcrowding. Additionally, for patients admitted to the ED, fast-track strategies are effective in significantly reducing EDLOS.

### Implications for research

Further studies with improved designs are needed to evaluate the use of POCT tests and determine their utility in reducing overcrowding. Additionally, it is necessary to enhance and standardize fast-track strategies, as well as the activities of physicians in triage, to better understand their effectiveness in reducing overcrowding and to decrease the high heterogeneity of studies.

#### Abbreviations

| | |
|---|---|
| EDLOS | Emergency Department Length of Stay |
| POCT | Point-of-Care Testing |
| ED | Emergency Department |
| LOS | Length of Stay |

## Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12873-024-01163-y.

Additional file 1: Search strategy

Additional file 2: Collection data instrument

Additional file 3: Physician at triage and EDLOS sensitivity analysis

Additional file 4: POCT and EDLOS sensitivity analysis

Additional file 5: Fast Track and EDLOS Sensitivity Analysis

Additional file 6: Funnel plot POCT and EDLOS group

#### Acknowledgements

Not applicable.

#### Authors' contributions

The authors contributed as follow to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content. GDJ contributed 50%; NEZ contributed 25% and VAV contributed 25%. All authors approved the version to be published and agreed to be accountable for all aspects of the work. All authors read and approved the final manuscript.

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#### Data availability

Data is provided within the manuscript and supplementary information files.

## Declarations

#### Ethics approval and consent to participate

The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. This research is classified within the category "no risk". Access to research instruments was limited only to investigators according to Article 8 of Resolution 008430/1993 by the Colombian Ministry of Health. The study was conducted at the Hospital Universitario Fundación Santa Fe de Bogotá, in Colombia, and was approved by the institution's research and ethics committee, "COMITÉ CORPORATIVO DE ÉTICA EN INVESTIGACIÓN", under approval number CCEI-16415–2024.

#### Consent for publications

Not applicable.

#### Competing interests

The authors declare no competing interests.

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