

## Objective

Assess the reported positive predictive value (PPV) of clinical decision support systems (CDSS) in computerized order entry (CPOE)

## Conclusion

- PPV varies massively : **5.8% to 83%**
- Majority of results: **20% to 40%**
- To reduce false positive
  - Keep only significant alerts
  - Improve contextualized information
  - Select patients with higher a priori probability



## Context

- CDSS has been shown to have positive effects on patient outcomes. However, the expected safety improvements that clinical decision support should bring could be jeopardized if clinicians override system alerts because of **alert fatigue**.
- One of the root causes of fatigue alert reported is the **low clinical relevance** of these alerts.

## Method

- A systematic search of the scientific literature:
  - published between February 2009 and March 2015
  - on CPOE, CDSS, and the predictive value associated with alert fatigue
  - Using PubMed database

*(CPOE[all fields] OR "Medical Order Entry Systems"[all fields] OR "Alert Systems"[all fields] OR "Order Entry"[all fields] OR "Decision support Systems"[all fields]) AND ((sensitivity[All Fields] OR sensibility[All Fields] OR predictive[All Fields] OR (fatigue[All Fields] OR overload[All Fields] OR overcharge[All Fields] OR burden[All Fields] OR override[All Fields] OR over alerting [All Fields] OR ignore[All Fields]))).*

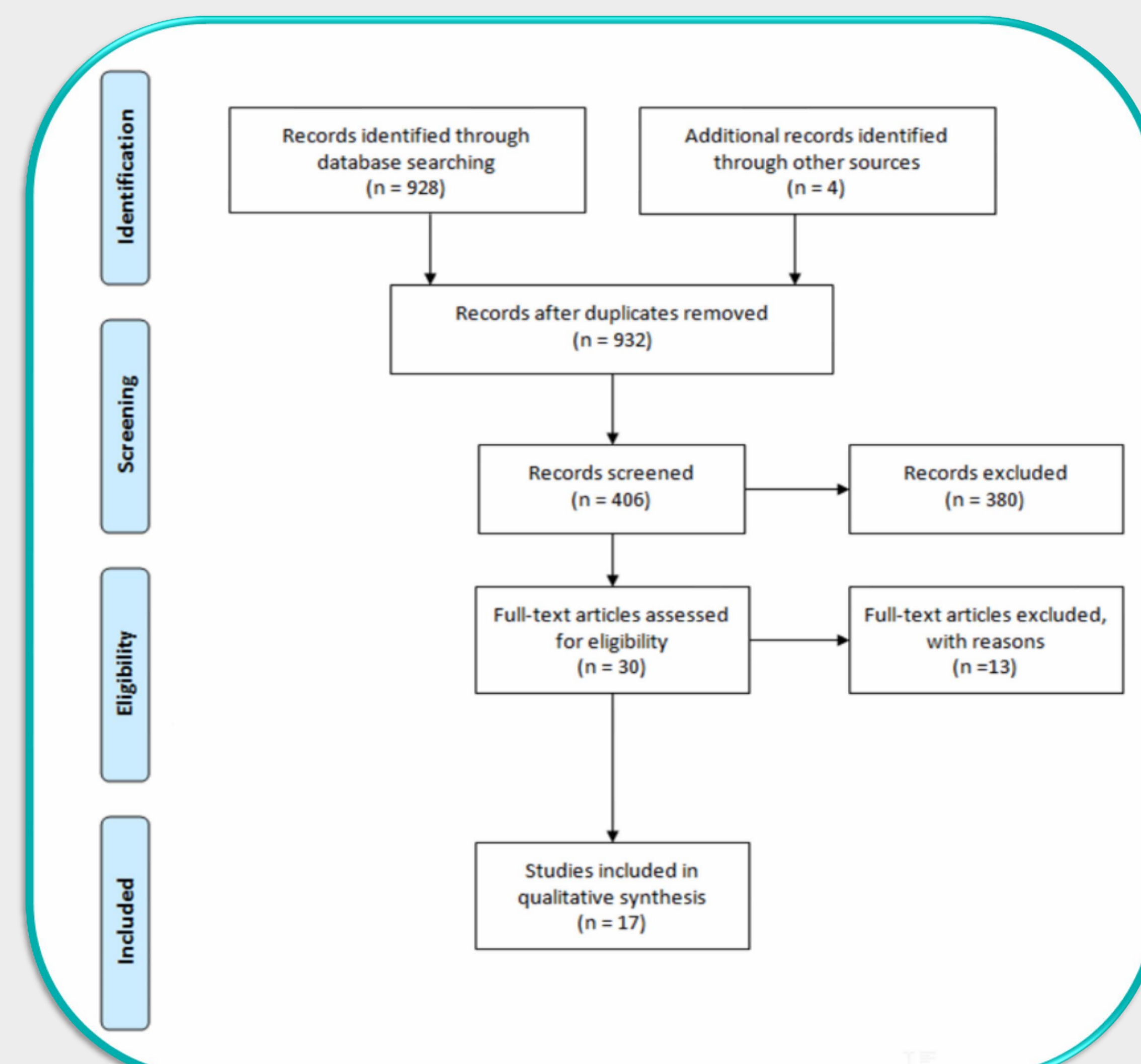
- Articles eligible for inclusion were:
  - English language
  - Full text available (free or pay for access)
  - Assessed medication
  - Direct or indirect level of predictive value, sensitivity (Se) or specificity (Sp)
- When possible, PPV was calculated or evaluated.

## Definitions

- **Se** : number of patients with an adverse drug event (ADE) detected by an alert, out of the total number of patients with a positive ADE.
- **Sp**: number of patients without an ADE and with no warning alert, out of the total number of patients without an ADE.
- **PPV** : number of relevant medication alerts (true positives) out of the total number of alerts (sum of true and false positives)

## Results

- **17 studies included:**



Predominantly interruptive alerts (n = 7/8 notified)

Main alert targets:

- drug-lab interactions (n = 11)
- drug-dosage interactions (n = 8)
- drug-drug interactions (n = 3)

**PPV** usually **low and heterogeneous** : 5,8% to 83% mostly between 20% and 40% \_ Se: 38% to 91%.

- **Factors that improve PPV:**
  - risk of experiencing an ADE (lower in prevention than in detection)
  - Advanced CDSS (taking into account patients' characteristics and laboratory test results)
    - PPV advanced CDSS : 34.1%-73,3%
      - highest: drug-lab alerts
    - PPV basic CDSS : 0% - 4.5%
      - lowest: drug-drug interaction
- **Factors that influenced PPV:**
  - patients' characteristics and co-morbidity
  - specific goal
  - medical specialty
  - alert's pharmacological target
  - choice of the alarm signal
  - specifying the administration route

