Improving Outcomes Through the Use of Inpatient Order Sets: A Systematic Review

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Disclosures

- Drs. Chang and Dietrich are employees of Zynx Health
- Drs. Langberg and Silka are employees of Cedars-Sinai Medical Center
- The views expressed in this presentation are those of the investigators and do not necessarily represent the views of Zynx Health or Cedars-Sinai Medical Center.

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Background

- Use of evidence-based order sets and computerized provider order entry (CPOE)
  - Identified by Health IT Policy Committee, a Federal Advisory Committee to the National Coordinator for Health IT, as early objective for meaningful use of electronic health record systems
- Increasing attention to evidence-based clinical decision support
  - May help drive improvements in quality, safety, and efficiency of patient care
- Little is known about the effects of evidence-based order sets on clinical outcomes

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“Does the use of evidence-based order sets improve clinical outcomes?”

Order Sets

- A compilation of medications, nursing items, labs, diagnostic tests, radiology tests, consults, etc., that might be selected by a clinician for the care of a patient being seen for a specific condition or procedure in a specific venue of care (e.g., admission to coronary care unit for acute myocardial infarction)

- Evidence-based versus expert-based

- Paper-based versus electronic forms–based versus computerized physician order entry (CPOE)

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Methods

- MEDLINE Search
  - 1999-2009
  - “order set” and “physician”
- Hand-searching included article reference lists
- Inclusion criteria
  - English language
  - Focus on evaluating the use of order sets by physicians in inpatient settings
- Exclusion criteria
  - Newsletter-type articles
- Study selection and abstraction with two investigators
  - Disagreements resolved by consensus

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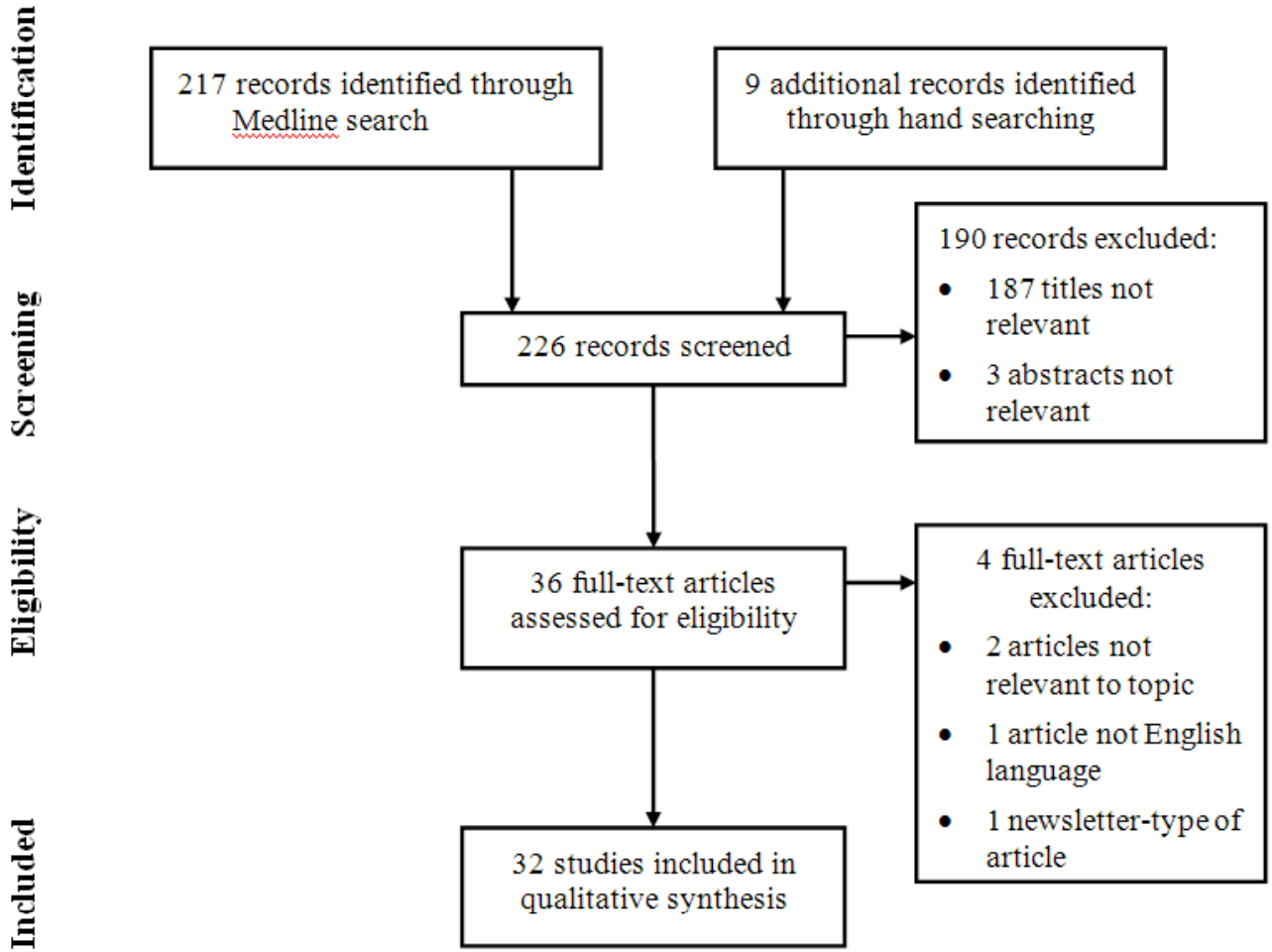
Results



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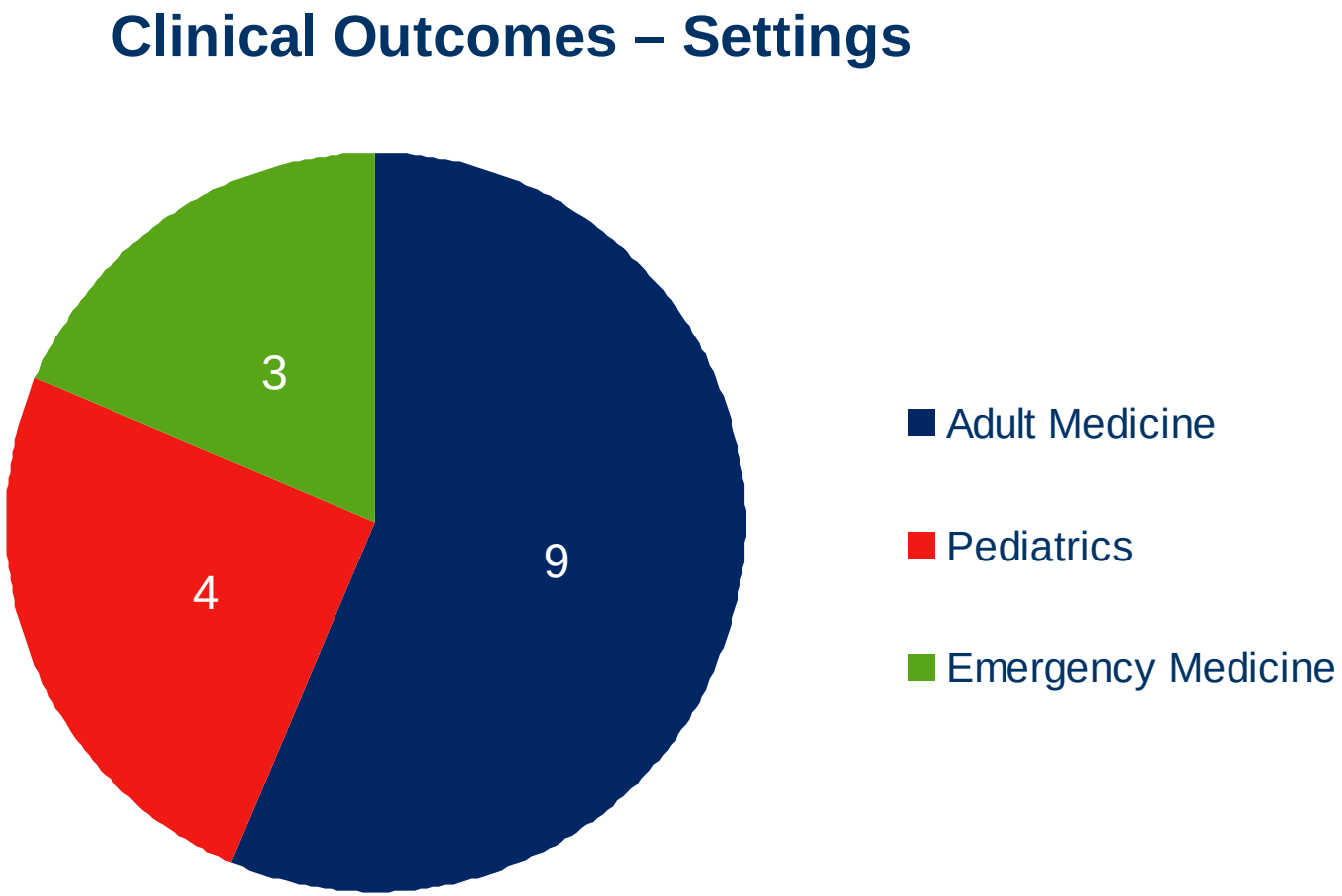
Results



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Emergency Department

- Septic shock (Micek et al)
  - Decreased mortality, decreased length of stay [LOS]
- Congestive heart failure [CHF] (Reingold and Kulstad)
  - Improved angiotensin converting enzyme inhibitor and IV nitroglycerin use
- Acute coronary syndrome [ACS] guideline adherence for the use of beta-blockers (Asaro et al)
  - No change

Micek et al, Crit Care Med 2006 November;34(11):2707-13.
Reingold and Kulstad, Acad Emerg Med 2007 November;14(11):1097-105.
Asaro et al, AMIA Annu Symp Proc 2005;6-10.

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Inpatient Pediatrics

- Asthma (Chisolm et al)
  - Improved corticosteroid use, pulse oximetry
- Procedural sedation (Broussard et al)
  - Decreased medication errors
  - Increased use of appropriate reversal agents
- Peripherally inserted central venous catheters (Migita et al)
  - Improved provider satisfaction
- Medication errors (Walsh et al)
  - Physician misuse 4 errors per 1,000 patient days

Chisolm et al, Pediatr Allergy Immunol 2006 May;17(3):199-206.
Broussard et al, J Pediatr 2009 June;154(6):865-8.
Migita et al, Pediatrics 2009 April;123(4):1155-61.
Walsh et al, Pediatrics 2006 November;118(5):1872-9.

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Inpatient Adults

- Acute myocardial infarction [AMI] (Eagle et al)
  - Reduced 30-day and 1-year mortality
- ACS (Ozdas et al)
  - Increased ASA use
- AMI (Santolin and Boyer)
  - More appropriate medication use
- Pneumonia (Fleming et al)
  - Reduced in-hospital and 30-day mortality
  - $1,278 per life saved

Eagle et al, J AM Coll Cardiol 2005 October 4;46(7):1242-8.
Ozdas et al, J Am Med Inform Assoc 2006 March;13(2):188-96
Santolin and Boyer, Crit Pathw Cardiol 2004 June;3(2):79-82
Fleming et al, Jt Comm J Qual Patient Saf 2009 August;35(8):414-21.

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Inpatient Adults

- Bacteremic sepsis (Thiel et al)
  - Decreased LOS, in-hospital mortality, renal failure
- Diabetes (Noschese et al)
  - Decreased orders for corrective-dose insulin
- Diabetes (Schnipper et al)
  - Improved glucose control
  - Decreased LOS
- VTE prophylaxis (O'Connor et al)
  - Increased orders for DVT prophylaxis
- Immunizations (Heffner et al)
  - Improved compliance with inpatient pneumococcal and influenza immunization recommendations

Thiel et al, Crit Care Med 2009 March;37(3):819-24.
Noschese et al, Qual Saf Health Care 2008 December;17(6):464-8.
Schnipper et al, J Hosp Med 2009 January;4(1):16-27.
O'Connor et al, J Hosp Med 2009 February;4(2):81-9.
Heffner et al, Jt Comm J Qual Saf 2004 July;30(7):366-76.

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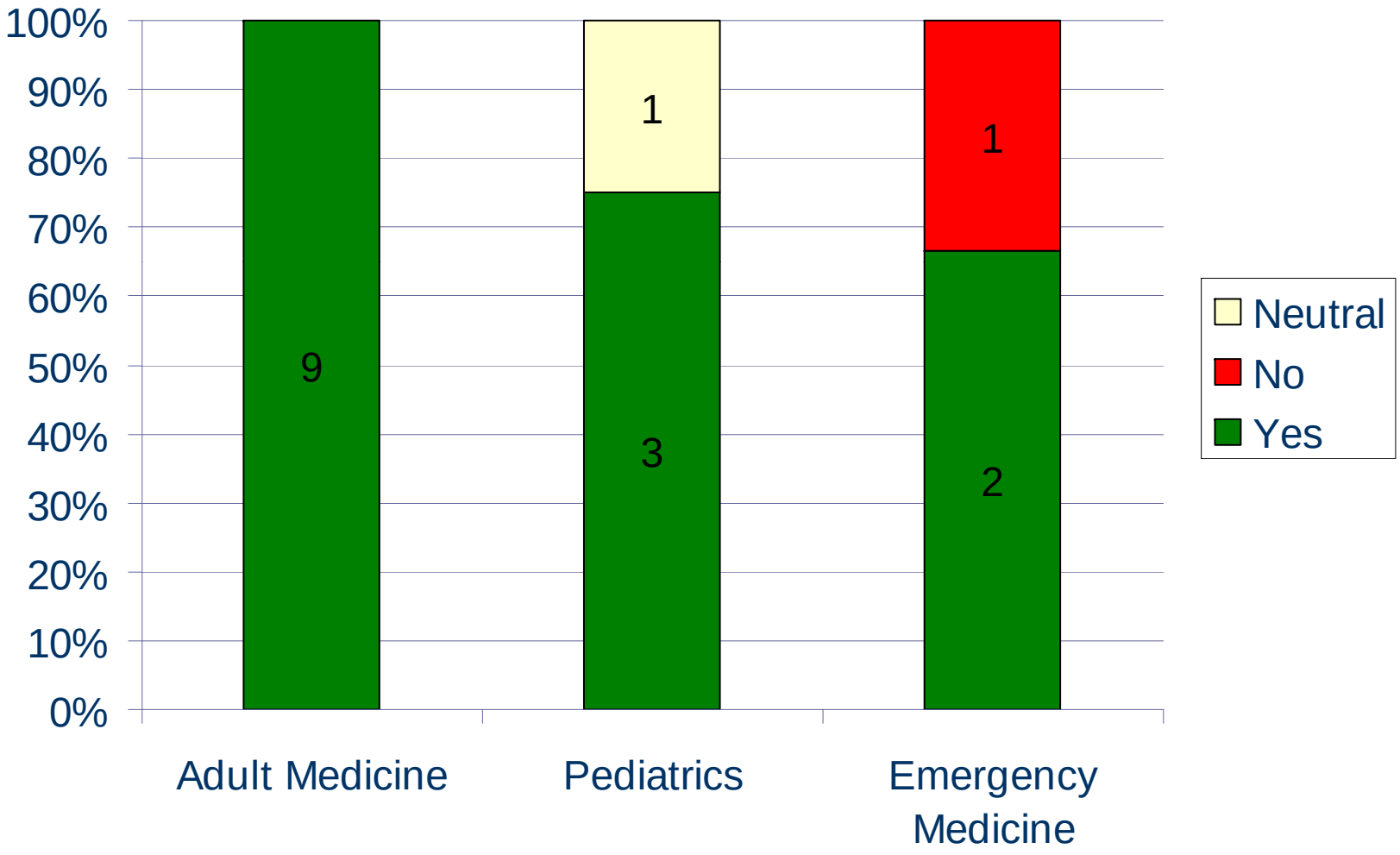
Improved Clinical Outcomes



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Discussion

- Use of order sets improves clinical outcomes in the inpatient setting
  - Improved appropriate medication use (6)
  - Mortality (4)
  - Improved specific disease management (3)
  - Length of stay (3)
  - Cost-effectiveness (1)

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Limitations

- Availability of original studies
- Heterogeneity of outcomes studied
- Heterogeneity of conditions studied

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Implications

- Use of order sets may help drive improvements in quality
- Use of evidence-based order sets remains an important objective for meaningful use of electronic health record systems
- Future research: Expand understanding of effectiveness to identify specific areas where evidence-based order set usage can derive the greatest value
  - More conditions
  - More settings
  - More types of outcomes (e.g., safety, financial, efficiency)
  - Future pooled analyses
    - Standardized generic outcome measures
    - Standardized condition-specific outcome measures

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Thank you

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