

# COMPUTERIZED PHYSICIAN ORDER ENTRY SYSTEMS AND RELATED CLINICAL DECISION SUPPORT TOOLS IN INPATIENT CARE BARRIERS OF COST-EFFECTIVENESS

Bella R<sup>1</sup>, Langer A<sup>1</sup>, Csanádi M<sup>1,2</sup>, Zemplényi A<sup>1,2</sup>, Botz L<sup>1</sup>

<sup>1</sup> University of Pécs, Pécs, Hungary,

<sup>2</sup> Syreon Research Institute, Budapest, Hungary,

<sup>3</sup> Eötvös Lóránd University, Budapest, Hungary

## Background:

Medication errors (ME) and the consequent preventable adverse drug events (pADE) are a major burden on inpatient care. They are not only possible source of patient harm but may lead to increased healthcare cost due to prolonged length of stay (LOS) as a consequent of pADEs. CPOE (Computerized physician order entry) occasionally with a clinical decision support tool (CDS) has been shown to increase patient safety, and it's essential for patient-level medication ordering. Due to the scarce financial resources of clinics and inpatient care exploration of new ways for being more cost-effective is a must.

## Purpose of the study:

Studies examining CPOE systems in inpatient care were collected with cost or other resource utilization related outcomes. Development of these services might be a good opportunity to expand of clinical pharmacist competencies.

## Methods:

We conducted a systematic search of Scopus, PubMed and Web of Science databases. Search terms were determined according to PICO. Non-English papers and studies providing no original data were excluded.

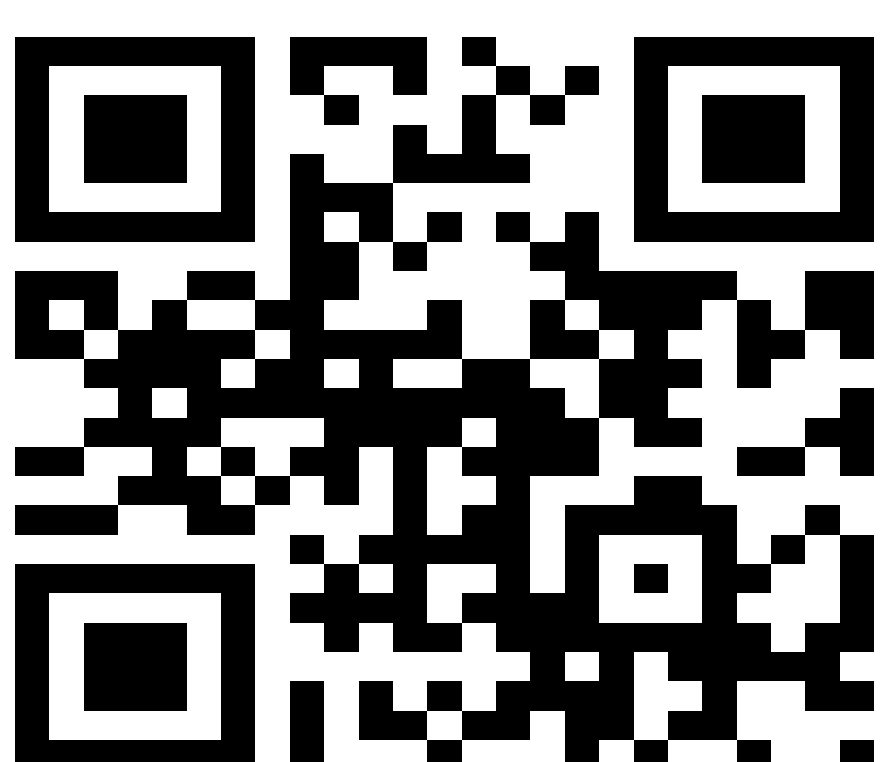
## Results:

1693 abstracts were screened, thereafter 67 full text articles become analyzed of which 27 met the inclusion criteria. We have identified 18 partial and 8 full economic evaluations. Except 1 cost-benefit and 1 cost-utility analysis all the publications included were cost-effectiveness studies. The clinical outcomes are dominated by pADE, although LOS (1 case), QALY (1 case) are also apparent. In contrast, the input parameters are quite different. Every analysis have demonstrated cost-reduction and patient safety enhancement but methodological differences are present in terms of perspective, discounting, duration, inflation, sensitivity, inputs and definitions (e.g. definition of ADE).

Author, year	Outcomes			Methods							
	Implementation, operational cost	Other outcomes	Benefit	Measuring ADE	Cost of ADE	Perspective	Discounting	Duration	Inflation	Sensitivity	
Kaushal 2006	• Hardware, software, network, leadership, training costs • Operational cost	\$11,8 M / 8y	• Cost of ADE • LOS • Decreased drug use • Time utilization • Laboratory test cost • Radiology cost	\$28,5M / 10+y	interaction alert	4685\$ (literature)	Not reported	7%	10	Included	Not included
Wu 2007	• Software, project management, clinical team, training • Support, interface, maintenance	\$3,32 M / 10y	∅	ICER: \$12700/ADE	Literature	∅	Hospital	5%	10	Not included	Included
Westbrook 2015	• Equipment, software, infrastructure, stafftime • Licences, training, updates	A\$61 741 / y	• Cost of ADE • LOS (from ADE)	\$97 740 - \$102 000 / y	chart review	£65-1760 (literature)	Hospital	5%	15	Included	Included
Karnon 2008	• No detail (literature)	£0.275-3.85 M + £0.094-0.715 M/y (5y)	• Cost of pADE • Antibiotic cost • Litigation cost • QALY (from ADE) • Value of lost health (assumption from QALY)	£31.5 M / 5y	Literature	£65-1760 (literature)	Not reported	Not included	5	Not included	Not included
Vermeulen 2014	• Hardware, software, equipment, stafftime • Maintenance, licence, support	€ 14,91/patient/day	∅	ICER: € 3.54/ME, € 322.70/pADE	medication record	∅	Hospital	Not included	1	Not included	Included
Nuckols 2015	• No detail (literature)	∅	• Provider work flow (literature) • Medication utilization, laboratory test (literature) • Cost of ADE, ME (literature)	\$133 billion / 6y / USA	Literature	No details (literature)	Societal	3%	10	Included	Included
Zimlichman 2013	• Servers, op. system, license, programming, network, project management, consultants, support • Training, maintenance, help desk, training, supply	\$7,1 M - \$19 M	• Cost of pADE	ROI: -3,1% - 11,3%	patient record	\$3,511 (study site)	Not reported	7%	10	Included	Included
De Giorgi 2010	• No details (medical IT team)	€ 1 M + 0,3 M/y	• Cost/criticality point gained	€ 22,47 / point	∅	∅	Hospital	Not included	∅	Not included	Included

## Conclusion:

The diversity of outcome data types used in these studies are making it difficult to draw a conclusion about cost-effectiveness of CPOE systems. It is visible, that no generally accepted definition is present over what system can be called CPOE. On the other hand, it will only be possible to compare different CPOEs if common agreement is developed in terms of outcomes observed by studies. Clinical pharmacists can play an important role in the unification of the upcoming studies and collection of data.



<http://www.eahp.eu/24-5PSQ-110>



PÉCSI TUDOMÁNYEGYETEM