

# Implementing & Optimizing Commercial Clinical Decision Support

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# Learning Objectives

1. Describe the opportunities and challenges of commercial, Clinical Decision Support(CDS).
2. Describe a strategic approach to effectively implementing drug-dose CDS.
3. List specific ways to optimize drug-dose CDS.

# Research Study Published in JAMIA

- *Optimizing Drug-Dose Alerts Using Commercial Software Throughout an Integrated Healthcare System*

Saiyed, SM. et al. *JAMIA*. 2017, 1-6

# Outline

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# CaroMont Health and Epic

- 1 tertiary care community hospital
- 2 ED locations
- 46+ Service sites
- 500 staff physicians
- 1,000 nurses
- **Annual Visits**
- Admissions: 20,000+
- ED Visits: 108,000+
- Ambulatory/ OP visits: 817,000+
- Epic 2015 Enterprise Version
- Hospital Live in 2015
- Clinics Live in 2014

**himss** Analytics' STAGE 6

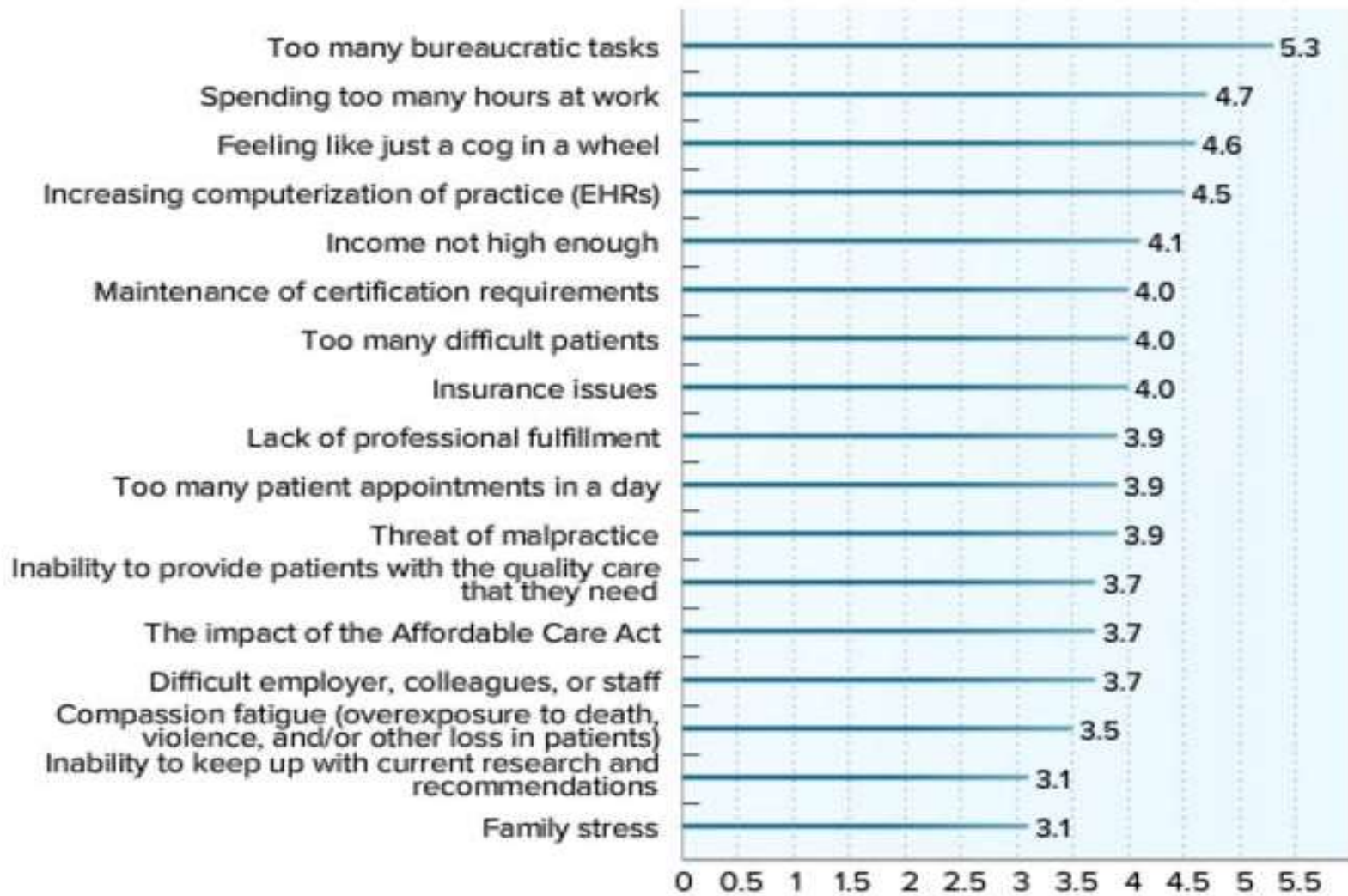
**O-EMRAM**

LEAPFROG  
**HOSPITAL**  
SAFETY GR<sup>A</sup>DE

 CaroMont Health

# Physician Burnout : Medscape 2016

## What Are the Causes of Burnout in Family Physicians?



# CPOE

- ❑ LeapFrog identify Drug-drug, drug-allergy, drug-diagnosis, and drug-dose alerts to reduce med errors
- ❑ Drug alerts over ridden 49-96 %
- ❑ Few studies describe strategies to optimize & improve
- ❑ Aim was to quantify drug alerts and identify strategies to implement

# Drug-Dose Checking

- ❑ Up to 60% of prescribing errors are dosing errors
- ❑ Dosing errors represent the most common type of preventable
- ❑ preventable adverse drug events
- ❑ 5-8% of all orders have dosing errors (~1/3 may be clinical significant)

*Pediatrics* 1987, *JAMA* 1990, *JAMA* 1995, *JAMA* 1995, *JAMA* 1997, *JAMA* 2001, *NEJM* 2002, *ARCH INT MED* 2004, *JGIM* 2005

DC Kaelber and DW Bates. *Health Information Exchange and Patient Safety*. Journal of Biomedical Informatics. 2007 (Review Article)



# Where do dose warnings come from?

- ❑ Medication Database Vendors
- ❑ Medi-span<sup>®</sup> or First DataBank<sup>®</sup>

# 9 Types of Drug-Dose Checking

- Below minimum daily dose
- Below minimum frequency dose
- Below minimum duration dose
- Below minimum single dose
- Exceeds maximum duration dose
- Exceeds maximum frequency dose
- Exceeds maximum daily dose
- Exceeds maximum single dose
- Exceeds daily prn dose

**~90% of Epic customers have drug-dose checking turned on**

# Outline

1. Describe the opportunities and challenges of commercial, drug alerts.
2. Describe a strategic approach to effectively implementing drug-dose checking.
3. List specific ways to optimize drug-dose checking.

# Team

- Family Medicine (CMIO), Internal Medicine –Pediatrics (CMIO) , Internal Medicine ( Informatics)
- Informatics Pharmacist
- Evaluated all strategies

# Drug-Dose Checking Strategy

- ❑ Drug-dose CDS should improve patient safety.
- ❑ Drug-dose CDS need optimization to be effective.
- ❑ Optimized drug-dose CDS should enhance sensitivity and specificity, reduce false positive alerts
- ❑ Reducing clinical low risk alerts and more effect alert

# Dose Warning Analysis

- Report from EHR
- Looked at three months of data
- Save in Excel, narrow down to warnings you plan to un-filter
- Use pivot tables to target most frequent warnings for deeper analysis

# Outline

1. Describe the opportunities and challenges of commercial, drug alerts.
2. Describe a strategic approach to effectively implementing drug-dose checking.
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# Methods - Strategies

- ❑ Turned off incomplete information drug-dose alerts.
- ❑ Turned off minimum drug-dose alerts.
- ❑ Increased single drug-dose threshold to 125%.
- ❑ Increased daily drug-dose threshold to 125%.
- ❑ Increased dose frequency drug-dose threshold by 2 doses per day.
- ❑ Changed drug specific maximum single and daily drug-dose alert parameters on top 1% of alerting drugs.



# Methods - Overview

- ❑ Default drug-dose alerts from Epic electronic health record using default Medi-Span® drug data.
- ❑ 1<sup>st</sup> quarter 2013 silent alerts for all drug-dose alerts (single dose, daily dose, dose frequency, and dose duration alerts), in different care settings and patient ages.
- ❑ System-wide and drug specific strategies analyzed to optimize drug-dose alerts.

**834,911 orders and 104,098 alerts**

## Results: Drug-dosing alerts by category, care setting

Alert type	Baseline Drug-Dose alerts, % (n)	ED, % (n)	IP, % (n)	OP, % (n)
Below minimum daily dose	24% (24,508)	12% (1684)	24% (12,922)	40% (9,902)
Below minimum frequency	10% (10,330)	7% (718)	50% (5,163)	43% (4,449)
Exceeded maximum duration	5% (4,972)	5% (245)	16% (816)	79% (3911)
Exceeded maximum frequency	16% (16,566)	17% (2,840)	55% (9,143)	28% (4,583)
Exceeded maximum daily dose	23% (24,183 )	15% (3,662 )	59% (14,177)	26% (6,344)
Exceeded maximum single dose	23% (23,539)	20% (4,594)	54% (12,760)	26% (6,171 )
<b>Total</b>	<b>100% (104,098)</b>	<b>13% (13,743)</b>	<b>53% (54,981)</b>	<b>34% (35,371)</b>

# Results: Impact of system level settings

System Level Drug-Dose Alerts	Optimization of drug-dose alerts, % (n)	Optimized drug-dose alerts per hundred orders	Decrease in drug-dose alerting, %
Minimum drug-dose daily dose alerts (removed)	0% (0)	0	100%
Minimum drug-dose frequency alerts (removed)	0% (0)	0	100%
Maximum drug-dose duration alerts (removed)	0% (0)	0	100%
Maximum drug-dose single dose alerts (increased to 125% of threshold)	42% (19,503)	2.3	17%
Maximum drug-dose daily dose alerts (increased to 125% of threshold)	44% (21,052)	2.5	13%
Maximum drug-dose dose frequency alerts (increased to more than 2 dose/day of threshold)	14% (6,433)	0.8	61%
<b>Sub-Total System Level Drug-Dose Alerts</b>	<b>100% (46,988)</b>	<b>5.6</b>	<b>45%</b>

# Results: Impact of “top” Drug Specific Settings

Drug-Dose Alert Category	Optimization of drug-dose alerts, % (n)	Optimized drug -dose alerts per hundred orders	Decrease in drug-dose alerting, %
Individual Level Drug-Dose Alerts			100%
Maximum drug-dose single dose alerts (top 22 individual dose adjustment customized)	0% (0)	0	100%
Maximum drug-dose daily dose alerts (top 22 individual dose adjustment customized)	0% (0)	0	100%
Sub-Total Individual Drug-Dose Alerts	0% (0)	0	100% <sup>1</sup>
Total	25,455	0.030	76%

1. Approximate

# Discussion

- ❑ Commercial, Out of the box drug-dosing CDS produces high (~12%) alerting rates.
- ❑ Primary, system approaches decreased drug-dose alerting to 5% (46,988/834,911) of orders.
- ❑ Secondary, drug-specific approaches decreased drug-dose alerting to 3% (25,455/834,911).
- ❑ Simple approaches significantly decrease drug-dose alerts, while maintaining drug-dose alerts for potentially clinically significant drug-overdoses.

# Lessons Learned

- ❑ Do not turn on “out of the box” drug-dose checking
- ❑ Conduct “silent” drug-dose checking analysis
- ❑ Develop system level setting strategy
- ❑ Develop sustainable individual drug strategy

**Implement drug-dose checking to help our patient  
(and in the way not to drive prescribers or  
pharmacists crazy)!**

# Questions