

CLINICAL DECISION SUPPORT

Co-Pilots:

Richard Mackenzie, MD FACEP
Chair, Dept Emergency Medicine
Lehigh Valley Hosp, Allentown, PA

Albert Villarín, MD FACEP
Solutions Executive
National Director Physicians Services
Thomson Reuters - Healthcare US



AirM.I.

Did you know?

- Education 3.0 -
 - **Information Revolution!**

Decision Support:

the 30,000 ft view.

- The clinical care of a patient requires many decisions as to the direction for the appropriate history, physical exam, testing, and treatment.
- Chief Complaint – “I am having chest pain”

True decision support should:

- “facilitate the physician’s ability to make the right decisions at each micro-step, in each of the processes mentioned above, at the time the decisions need to be made.”

- Decision support in its purest form must:
 - mitigate error and,
 - at best, lead the physician down the path of correct decisions without any utilization waste.

Five Rights of CDS:

To improve care outcomes with CDS you must provide:

- the **Right Information...**
Evidence-based, useful for guiding action and answering questions
- ...to the **Right Stakeholder...**
Both clinicians and patients
- ...in the **Right Format...**
Alerts, Order Sets, answers, etc.
- ...through the **Right Channel...**
Internet, mobile devices, clinical information systems
- ...at the **Right Point in the Workflow**
- to influence key decisions/actions

Welcome to AirM.I. Airlines

- AirMI Airlines has planes leaving ontime today.
 - Regular intervals – no variance
 - Delays and Irregular - variance
- The most advanced decision support system, after years of evolution, exists today in modern aviation.
- While crew resource management is a key component in reduction of error, this talk will focus on decision support as a metaphor for the NEAR future of healthcare.

Pectusdolor 3000

- All of our jets are the
- Pectusdolor 3000
 - with full informatics
- Crash avoidance systems are standard
- Dark panel rules apply
 - Panel lights only if important at the moment.



The System Overview:



Security

Involving patient characteristics or presentation context
Concerned about hijacking because of ethnicity of customer

Airline

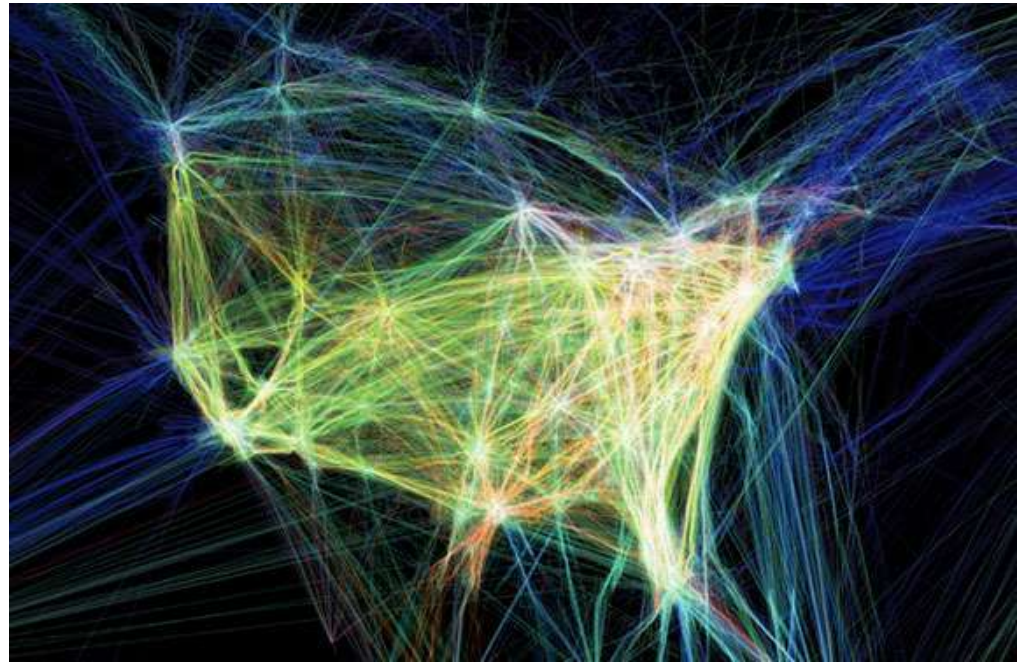


ED



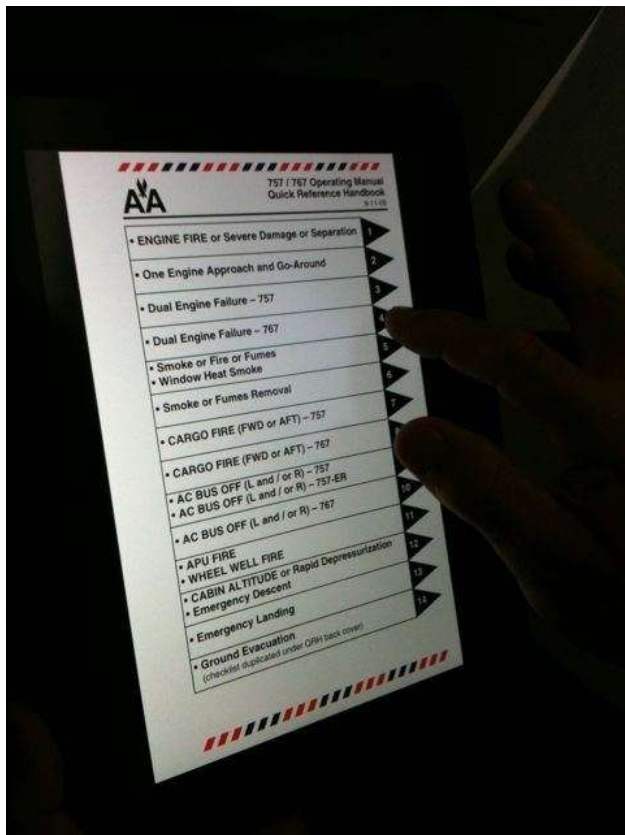
Prep for takeoff

- Education and training
- Protocols = Flight pattern – Transparent/Verified
- Library/Wed services
- Error correction



Taxi

Runway : checklist (listen...!!)



ED : checklist

- Dashboard Visual Management
- Working within the system – charge nurse is air control
- Error correction

Take off

Flight



ED care

- Templates = checklists
- Order sets
- Just in time information – resources
- Diagnostic aids – DDX generator
- Severity stratification (TIMI scoring ... even Goldman criteria)
- **Error correction**

Wheels up and high altitude cruising

Autopilot



ED

- Critical Value reporting
- Error correction
- Types or Error:
 - Juxtaposition
 - Judgment
 - Zebra

Juxtaposition Error

- Over attachment to a particular diagnosis
 - Pilot wants to go to somewhere not right due to inheriting someone else's thinking
- Pilot informed with bad information and goes wrong direction



CDRs association:

Pilot Judgment



Physician Judgment

- Physician affect or personality
- U.F.O. seen
 - (relative to physician)
- Give up - Zebra retreat

Turbulence

Fear of the Unexpected



ED Unexpected changes

- Change course/altitude – new information communication
- Error correction

Change pilots and/or air control

Pilot coordination



- Handoff communication = templates to get right
- **Error correction**

Descent

Altitude changes



Clinical demise / Admission

- Communication with team
- Communication with landing airport = admission
- Error correction

Landing

Computer Guided : Flight Path



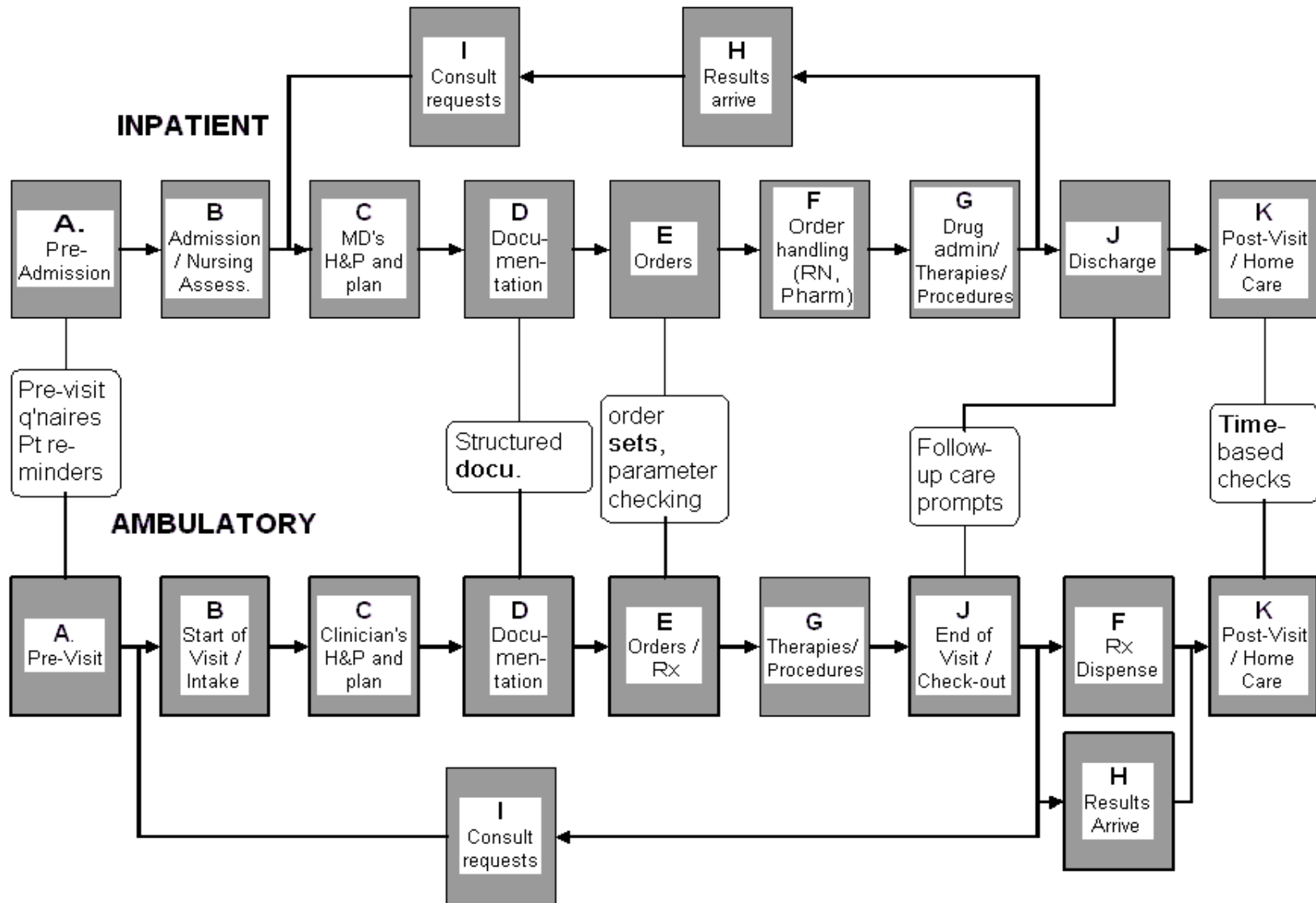
CDS Progress

- Discharge instructions
- Documentation of admission conversation and handoff
- Admission order sets
- Error correction

CDS INTERVENTION - TYPES/EXAMPLES

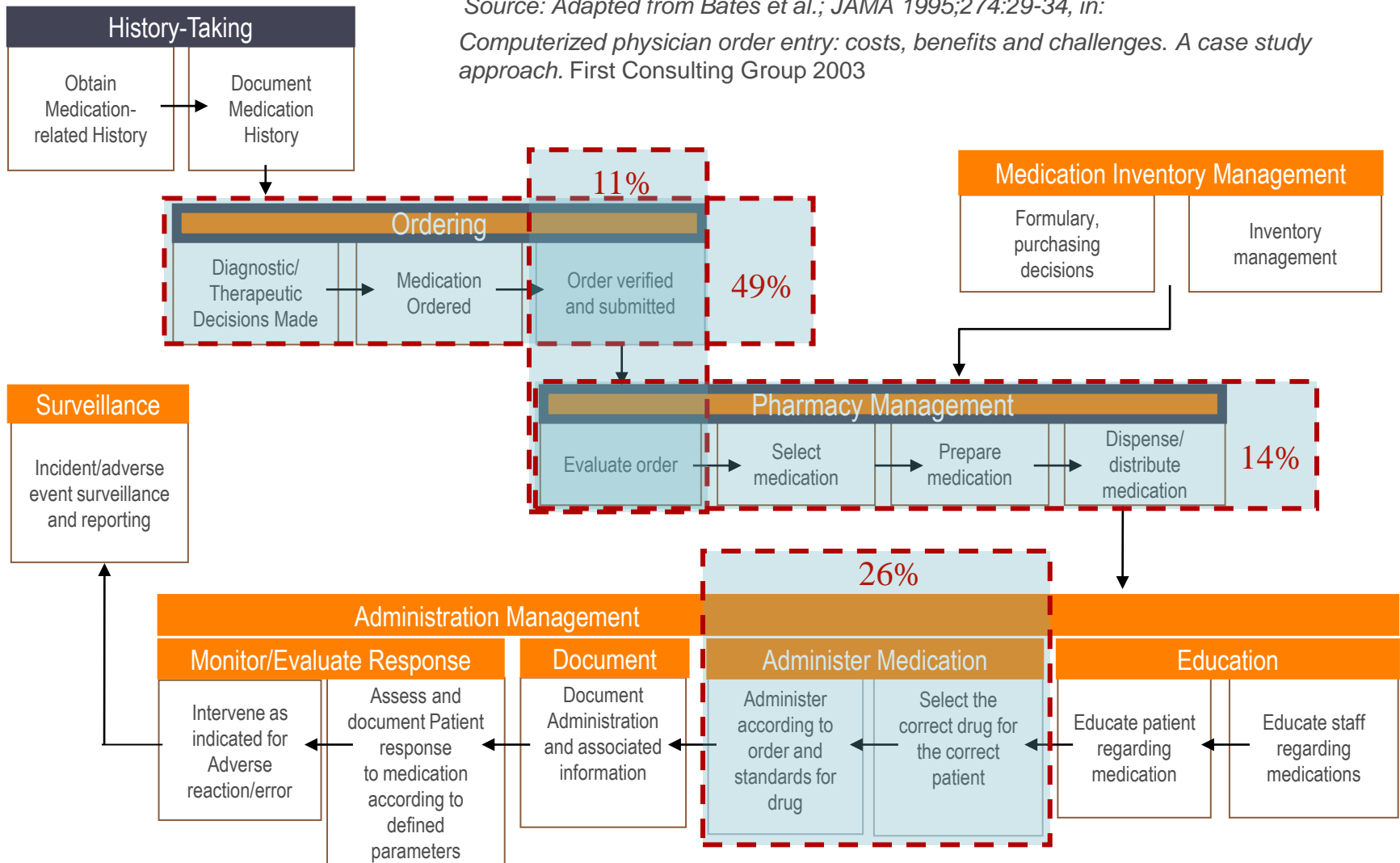
- Relevant data presentation: *flowsheets, surveillance*
- Order creation facilitators: *order sentences, sets*
- Reference information: *infobuttons, Web*
- Unsolicited alerts: *proactive warnings*
- Documentation templates: *patient history, visit note*
- Protocol support: *pathways*

Workflow Opportunities for CDS

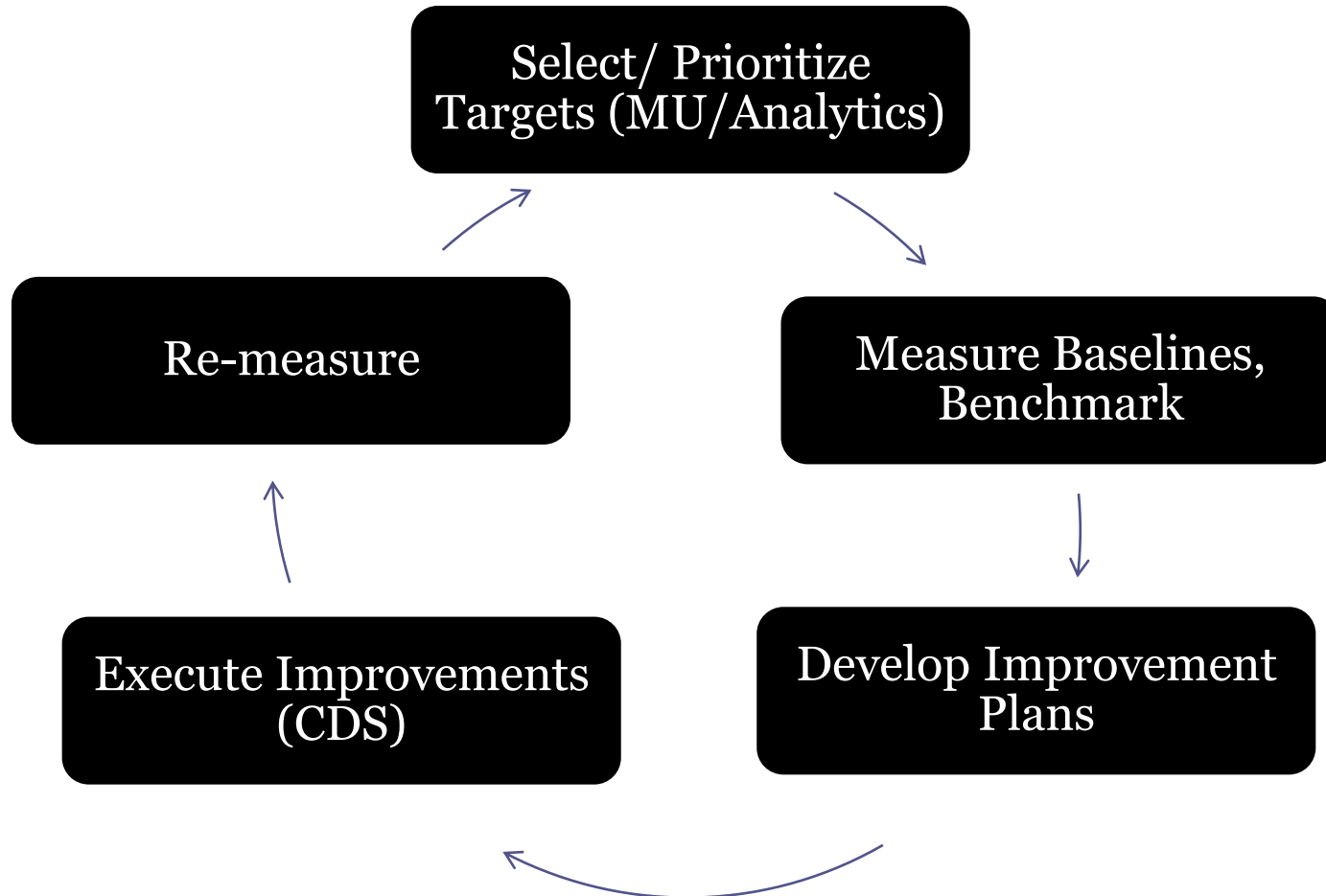


MEDICATION MANAGEMENT PROCESS - WHERE ADVERSE DRUG EVENTS ORIGINATE

Source: Adapted from Bates et al.; JAMA 1995;274:29-34, in: Computerized physician order entry: costs, benefits and challenges. A case study approach. First Consulting Group 2003



PERFORMANCE IMPROVEMENT: A SYSTEMATIC APPROACH



VISIBLE LIVE DATA - DECISION SUPPORT USER INTERFACE

Visits in the ED
(4/14/2004 at 12:14)

My Menu
Sign In
Maps/News
Areas
Work Queues
Search
Resources
Admin

A01	Editor ▶	Kitten, D [F-49y] ③ abdominal pain Family in Waiting Room	Rowlett, Raelynn	Villarin, Albert Ankam, Nethra	Doctor Saw Room A01 @ 16:14 Lab 0:0:0 - Rad 0:0:0	Hrs -2:07 [CENMUX]
A06	Editor ▶	Buffalo, J [M-45y] ④ Right Sided Pain Frequent Urinating H		Vanderbeek, Paul Bailey, Philemon	Dispo Ordered: Discharged ✗ Location Not Specified Lab 0:1:1 - Rad 0:0:2	Hrs 1:08 [CENMUX]
A07	Editor ▶	Rooster, K [M-54y] ④ Right Side Hip And Leg Pain 0	Congdon, Frank	Vanderbeek, Paul	Dispo Ordered: Discharged ✗ Location Not Specified Lab 0:0:0 - Rad 0:0:0	Hrs 1:08 [CENMUX]
A10 1234B	Editor ▶	Moose, W [M-77y] ① Resp. Distress	Hayburn, David	Kelly, John	Bed Request ✗ Location Not Specified Lab 3:3:5 - Rad 0:1:1	Hrs 1:32 [CENMUX]
A11	Editor ▶	Jackal, J [M-38y] ③ Found In Caf Dizzy Lightheaded Diaphoretic <i>Dr Mok to see</i>	Hayburn, David	Mok, Maise	Doctor Saw ✗ Location Not Specified Lab 3:0:1 - Rad 1:0:0	Hrs -1:07 [CENMUX]
A12 GMF	Editor ▶	Warthog, N [M-82y] ③ Sob 1E1 C1EVP Started Couple Days Ago <i>FBG#3794 — PT MAY GO TO ADM. UNIT</i>	Dennis, Anthony	Vanderbeek, Paul	Preliminary Bed ✗ Location Not Specified Lab 0:4:4 - Rad 0:0:1	Hrs 3:45 [CENMUX]
A14	Editor ▶	Horse, S [F-45y] ③ Urinary Tract Infection Pain Abd N <i>labs pending u.dip leuks via str cath</i>	Wheeler, Carolyn	Coradi, Scott	Dispo Ordered ✗ Location Not Specified Lab 4:1:2 - Rad 0:0:0	Hrs 1:08 [CENMUX]
A15	Editor ▶	Cat, N [F-46y] ④ 6 Days Ago Left Hip Pain No Trauma U <i>walk</i>	Wheeler, Carolyn	Vanderbeek, Paul	Dispo Ordered: Discharged ✗ Location Not Specified Lab 0:0:0 - Rad 0:0:0	Hrs 3:44 [CENMUX]
A16	Editor ▶	Platypus, R [M-75y] ③ Lt Side Cp Started 30 Mts Ago Come And G	Beckman, Joe	Coradi, Scott	Dispo Ordered ✗ Location Not Specified Lab 0:4:0 - Rad 0:1:1	Hrs -1:31 [CENMUX]
A17	Editor ▶	Platypus, S [M-50y]	Beckman, Joe	Kelly, John	Preliminary Bed	Hrs 2:56

Local intranet

CDS INTERVENTION EXAMPLE: PATIENT PROFILING AND ALERTING - Live Surveillance

Rule: Find patients who can be switched from intravenous to oral medications (improving safety/cost)

Display: results to rounding clinicians

IV to PO Conversion

Properties

Name IV to PO Conversion
Type Account
Account Type profiles identify patients who meet the criteria within a single account.

Query

AND

- Inpatient Profile
 - Medication Key =(text) LEVAQUIN, CIPRO, DIFLUCA RIFAMPIN, ZITHROMAX, ZYVOX, PREVACID, PROTO REGLAN, FOLIC ACID, MVI, THIAMINE
 - AND restrict to Active Meds
 - Result Key =(text) TEMP
 - AND Result < 100
 - AND Days since update < 1
 - Result Key =(text) SBP
 - AND Result >= 90
 - AND Days since update < 1
 - Result Key =(text) HEART RATE
 - AND Result <= 100
 - AND Days since update < 1
 - Result Key =(text) ARTERIAL O2 SAT
 - AND Result >= 90
 - AND Days since update < 1

Publish

Update Interval every 30 minutes
Publish As List Yes
List Name IV to PO Conversion

Email to clinician



From Alerts@ExemplaryHospital.com
Sent: Friday, July 2, 2010 10:08AM
To: Pharmacy@ExemplaryHospital.com
CC: ClinicalXpertAdmin@ExemplaryHospital.com
Subject: Alert: IV-to-PO Conversion

3 patients have been added to the CareFocus List: IV-to-PO conversion.

Please login to Navigator to view the details.

This message is for the subscribed recipients only.



CHECKLIST FOR SUCCESSFUL CDS PROGRAMS

- Shared understanding of CDS as performance improvement tool
 - [CDS Five Rights approach](#) to addressing improvement objectives, e.g. broad consideration of CDS recipients, channels, formats
 - Commitment to measurement; e.g. performance baselines, effects of interventions
- Explicit mechanisms for CDS governance in place
 - CDS Program charter in place
 - CDS governance appropriately integrated with quality and HIT governance
 - All pertinent stakeholders are engaged in CDS program governance
 - Explicit mechanisms for prioritizing CDS-mediated improvement objectives, based on internal/external driver
- Knowledge management policies and mechanisms in place
 - Explicit responsibilities/approach for managing CDS content currency, consistency
 - Knowledge management approach is systematic and proactive

Discussion

Airline Industry

- Security – recorded / accessible
- Check Lists – industry standard
- Flight Paths - transparent
- Pre-planned response to unexpected flight issues
- Computer Assisted
 - Take Off and Landing
- 360 Dashboard for In-Flight Information – Live Data

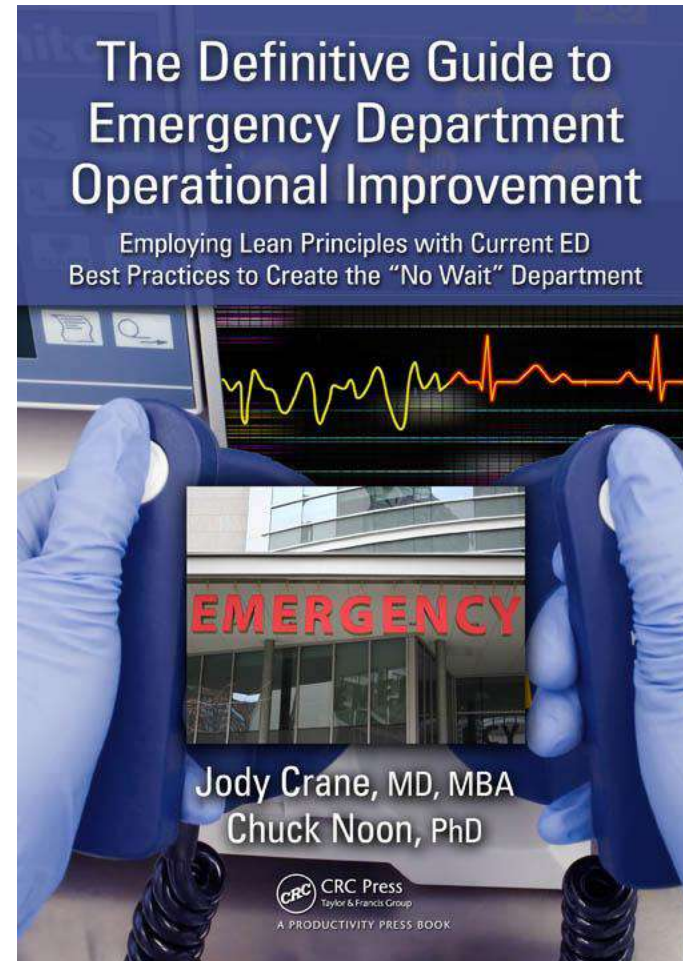
Healthcare Industry

- Patient Safety
- Patient Flow Lanes
- **LEAN** Processing
- Pre-planned response to unexpected clinical outcomes
- Computer Assisted Clinical Decision Support
- 360 Dashboard for Clinical Information – Live Surveillance

Winner of the 2009 HIMSS Book of the Year Award:

Improving Medication Use and Outcomes with Clinical Decision Support: A Step-by-Step Guide

edited by Jerome Osheroﬀ, MD, is co-published by HIMSS, the Scottsdale Institute, AMIA, ISMP, ASHP, and AMDIS.



QUESTIONS

RICHARD MACKENZIE, MD FACEP
Richard.Mackenzie@lvh.com

L. ALBERT VILLARIN, JR MD FACEP
Al.Villarin@ThomsonReuters.com