Evidence Based Medicine

- Closing The Loop

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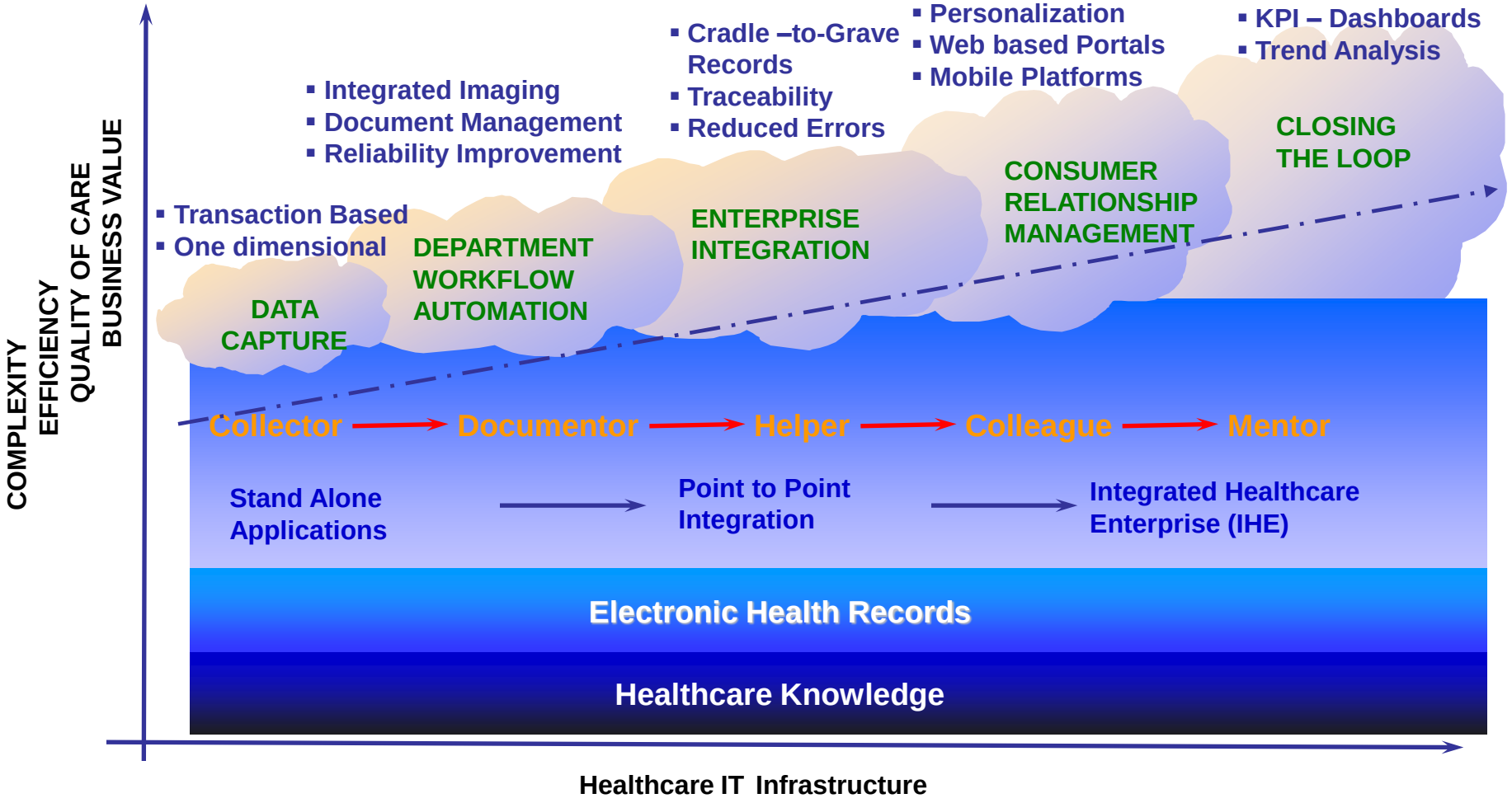
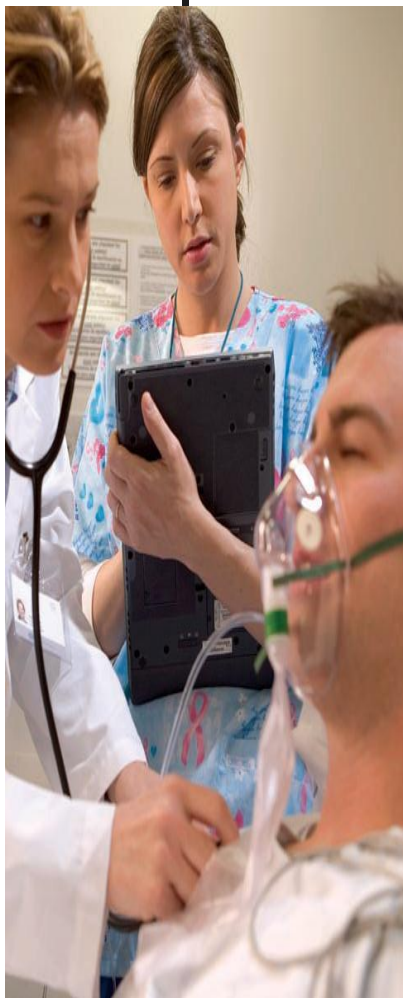
Health delivery has changed with time and so have electronic systems to support health delivery. However closing the loop remains a challenge..



Source: CPOE: Way Forward, paper presented by Dr Pankaj Gupta in ICMIT, IIT Kharagpur, 2005

CPOE: Patient Safety

Integrated System

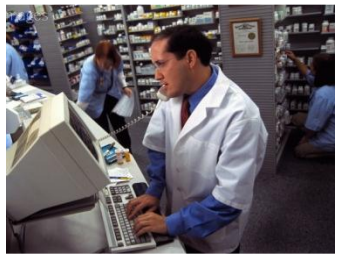


Disparate System

- While assessing a patient recovering from a heart condition, the physician discovers a **patient allergy** to the current medication
- **Physician** orders alternative medication
- **Pharmacist** dispenses previous medication**,** unaware of the new order
- **Nurse** administers medication without notification of the change
- **Executive** lacks solid data to analyze in effort to prevent future error
- ***Patient becomes a victim of preventable error***

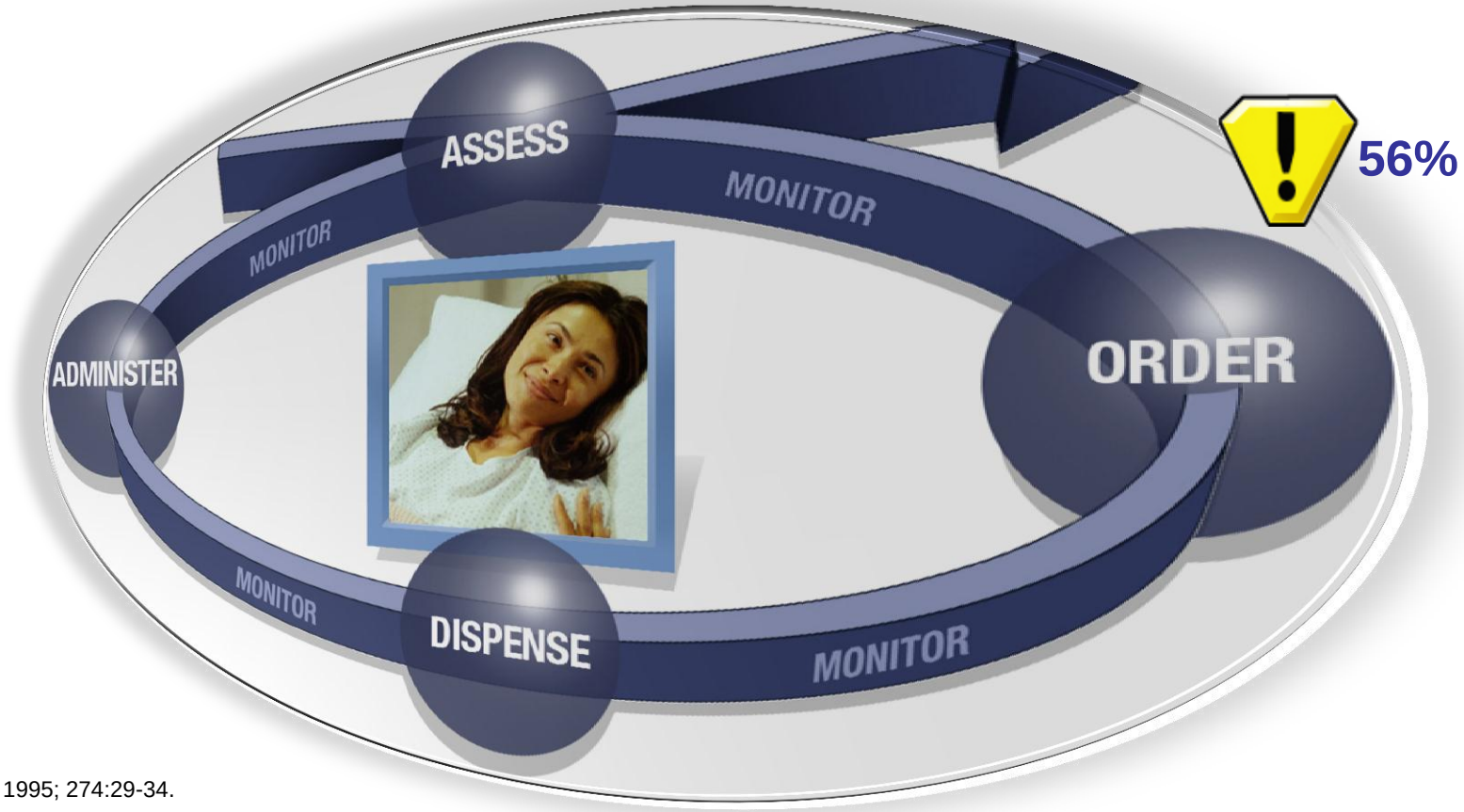
Integrated Enterprise

- While ordering a medication for a patient admitted with a heart condition, a **physician** receives an alert
- **System** recognizes a patient allergy documented by the nurse
- **Physician** chooses an alternate drug and modifies the order
- **Pharmacist** notified of change, dispenses the correct medication
- **Nurse** administers correct drug and documents administration time
- **Executive** collects better data for clinical and business analysis
- ***A positive patient outcome***



Clinicians can give orders anywhere in the hospital as they are ubiquitous beings

`*56% of medication errors occur at time of order**
However medical errors can occur anywhere and need to be prevented



*Source: Bates et al JAMA 1995; 274:29-34.

IOM study “To Err Is Human”

Types of Errors

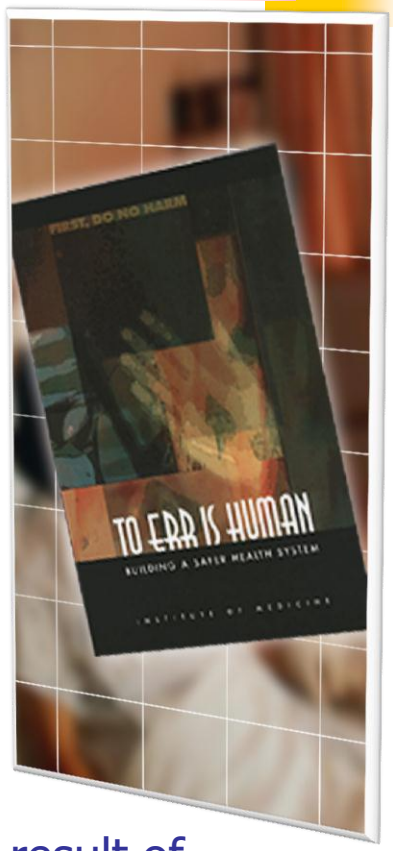
Diagnostic
- Error or delay in diagnosis
- Failure to employ indicated tests
- Use of outmoded tests or therapy
- Failure to act on results of monitoring or testing

Treatment
- Error in the performance of an operation, procedure, or test
- Error in administering the treatment
- Error in the dose or method of using a drug
- Avoidable delay in treatment or in responding to an abnormal test
- Inappropriate (not indicated) care

Preventive
- Failure to provide prophylactic treatment
- Inadequate monitoring or follow-up of treatment

Other
- Failure of communication
- Equipment failure
- Other system failure

SOURCE: Leape, Lucian; Lawthers, Ann G.; Brennan, Troyen A., et al. Preventing Medical Injury. Qual Rev Bull. 19(5):144–149, 1993.



- **44,000 to 98,000 people die** in US hospitals each year as a result of medical errors that could have been prevented (according to IOM report based on estimates from two major studies.)
- Preventable medical errors in hospitals exceed attributable deaths to such feared threats as **motor-vehicle wrecks, breast cancer, and AIDS**.

"Preventing errors and improving safety for patients require a systems approach in order to modify the conditions that contribute to errors."

To Err is Human: Building a Safer Health System. Washington, DC, National Academy Press, 1999

Category	Score	
Therapeutic Duplication	85.71	
Single and Cumulative Dose Limits	18.18	
Allergies and Cross Allergies	66.67	*
Contraindicated Route of Administration	75	*
Drug:Drug Interactions	66.67	
Drug:Food Interactions	100	
Drug:Diagnosis Interactions	100	
Contraindication / Dose Limits Based on Age and Weight	100	
Contraindication / Dose Limits Based on Laboratory Studies	75	*
Contraindication / Dose Limits Based on Radiology Studies	0	
Corollary Orders	100	
Cost Of Care	50	
Deception Analysis	25	
Nuisance Orders	50	

THE LEAPFROG GROUP for Patient Safety
Rewarding Higher Standards

www.leapfroggroup.org

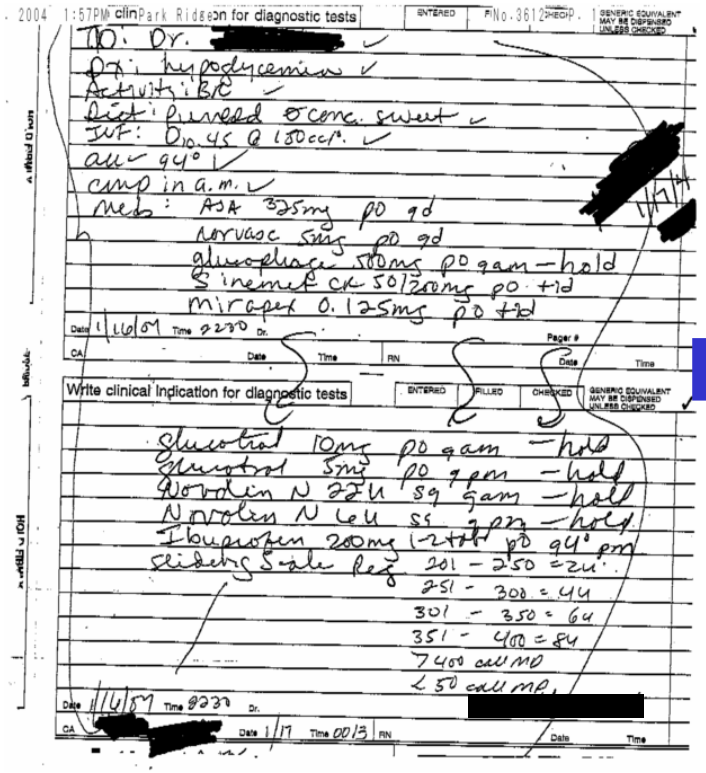
Their goal is to initiate-
- Breakthroughs in the safety and quality of health care in the US

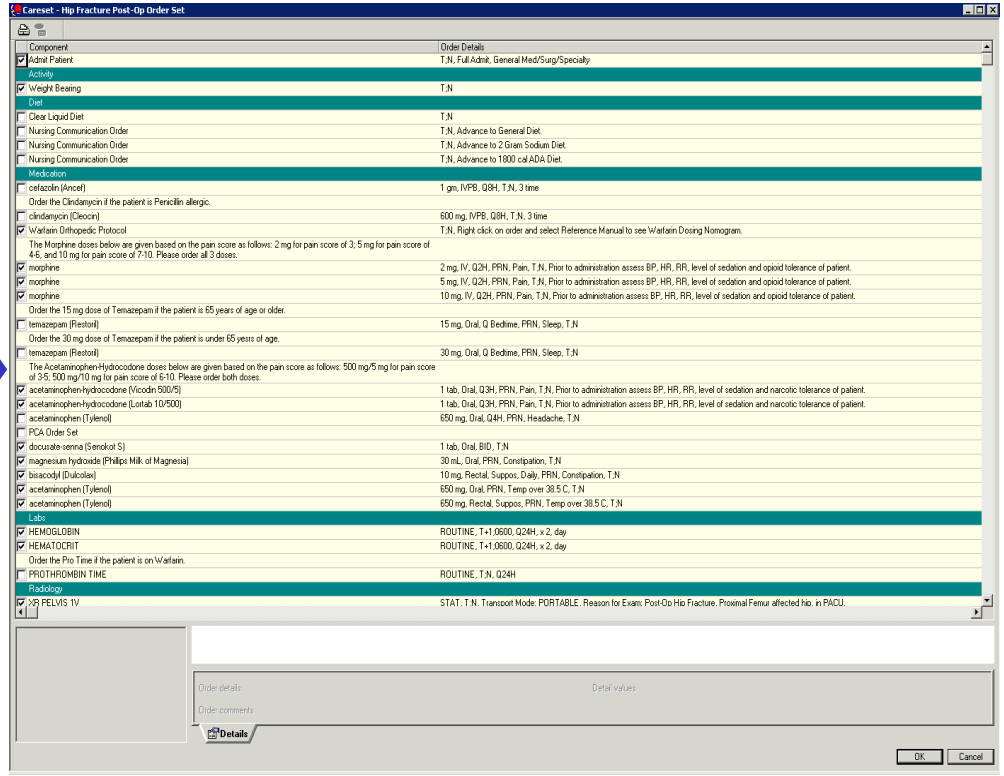
Your TOTAL score reflects:	
	Fully implemented recommended safety practice

*The Order Entry system accepted an order that would have caused severe harm, if not death to the patient.

Sign out

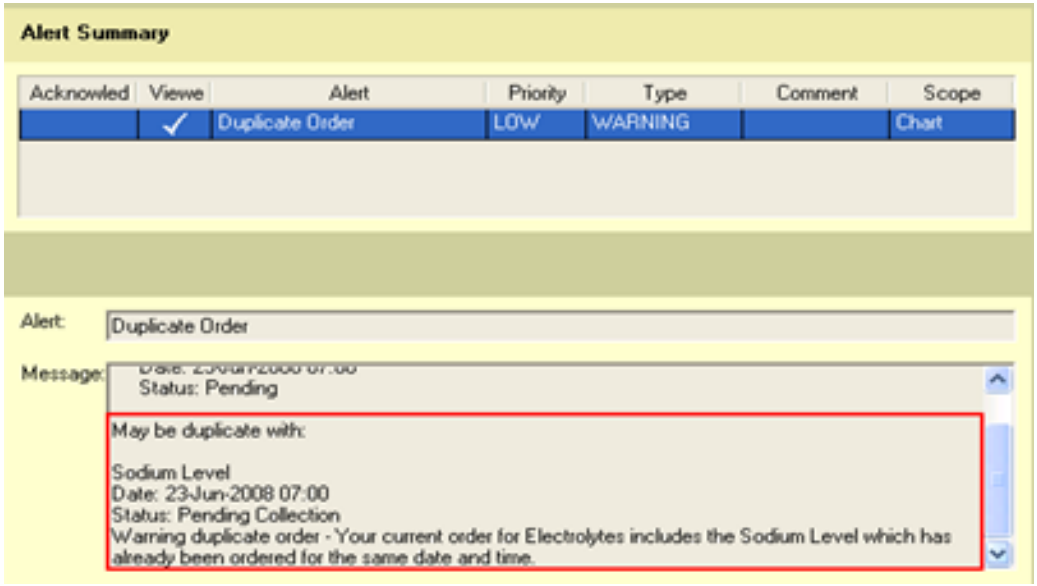
Why CPOE?


Write clinical indication for diagnostic tests
ENTERED
FILLED
CHECKED
GENERIC EQUIVALENT MAY BE DISPENSED UNLESS CHECKED


Careset - Hip Fracture Post-Op Order Set
Component
Order Details
Admit Patient
T,N, Full Admit, General Med/Surg/Specialty
Activity
Weight Bearing
T,N
Diet
Clear Liquid Diet
Nursing Communication Order
Nursing Communication Order
Nursing Communication Order
Medication
cefazolin (Ancef)
1 gm, IVPB, Q8H, T,N, 3 time
Order the Clindamycin if the patient is Penicillin allergic.
clindamycin (Cleocin)
600 mg, IVPB, Q8H, T,N, 3 time
Warfarin Orthopedic Protocol
T,N, Right click on order and select Reference Manual to see Warfarin Dosing Nomogram.
The Morphine doses below are given based on the pain score as follows: 2 mg for pain score of 3; 5 mg for pain score of 4-6, and 10 mg for pain score of 7-10. Please order all 3 doses.
morphine
2 mg, IV, Q2H, PRN, Pain, T,N, Prior to administration assess BP, HR, RR, level of sedation and opioid tolerance of patient.
morphine
5 mg, IV, Q2H, PRN, Pain, T,N, Prior to administration assess BP, HR, RR, level of sedation and opioid tolerance of patient.
morphine
10 mg, IV, Q2H, PRN, Pain, T,N, Prior to administration assess BP, HR, RR, level of sedation and opioid tolerance of patient.
Order the 15 mg dose of Temazepam if the patient is 65 years of age or older.
temazepam (Restoril)
15 mg, Oral, Q Bedtime, PRN, Sleep, T,N
Order the 30 mg dose of Temazepam if the patient is under 65 years of age.
temazepam (Restoril)
30 mg, Oral, Q Bedtime, PRN, Sleep, T,N
The Acetaminophen-Hydrocodone doses below are given based on the pain score as follows: 500 mg/5 mg for pain score of 3-5; 500 mg/10 mg for pain score of 6-10. Please order both doses.
acetaminophen-hydrocodone (Vicodin 500/5)
1 tab, Oral, Q3H, PRN, Pain, T,N, Prior to administration assess BP, HR, RR, level of sedation and narcotic tolerance of patient.
acetaminophen-hydrocodone (Lortab 10/500)
1 tab, Oral, Q3H, PRN, Pain, T,N, Prior to administration assess BP, HR, RR, level of sedation and narcotic tolerance of patient.
acetaminophen (Tylenol)
650 mg, Oral, Q4H, PRN, Headache, T,N
PCA Order Set
docusate-senna (Senokot S)
1 tab, Oral, BID, T,N
magnesium hydroxide (Phillips Milk of Magnesia)
30 mL, Oral, PRN, Constipation, T,N
bisacodyl (Dulcolax)
10 mg, Rectal, Suppos, Daily, PRN, Constipation, T,N
acetaminophen (Tylenol)
650 mg, Oral, PRN, Temp over 38.5 C, T,N
acetaminophen (Tylenol)
650 mg, Rectal, Suppos, PRN, Temp over 38.5 C, T,N
Labs
HEMOGLOBIN
ROUTINE, T+1,0600, Q24H, x 2, day
HEMATOCRIT
ROUTINE, T+1,0600, Q24H, x 2, day
Order the Pro Time if the patient is on Warfarin.
PROTHROMBIN TIME
ROUTINE, T,N, Q24H
Radiology
PELVIS 1V
STAT, T,N, Transport Mode: PORTABLE, Reason for Exam: Post-Op Hip Fracture, Proximal Femur affected hip, in PACU.
Order details
Detail values
Order comments
Details
OK
Cancel

Order Entry – Review Allergy/Health Issue while Ordering

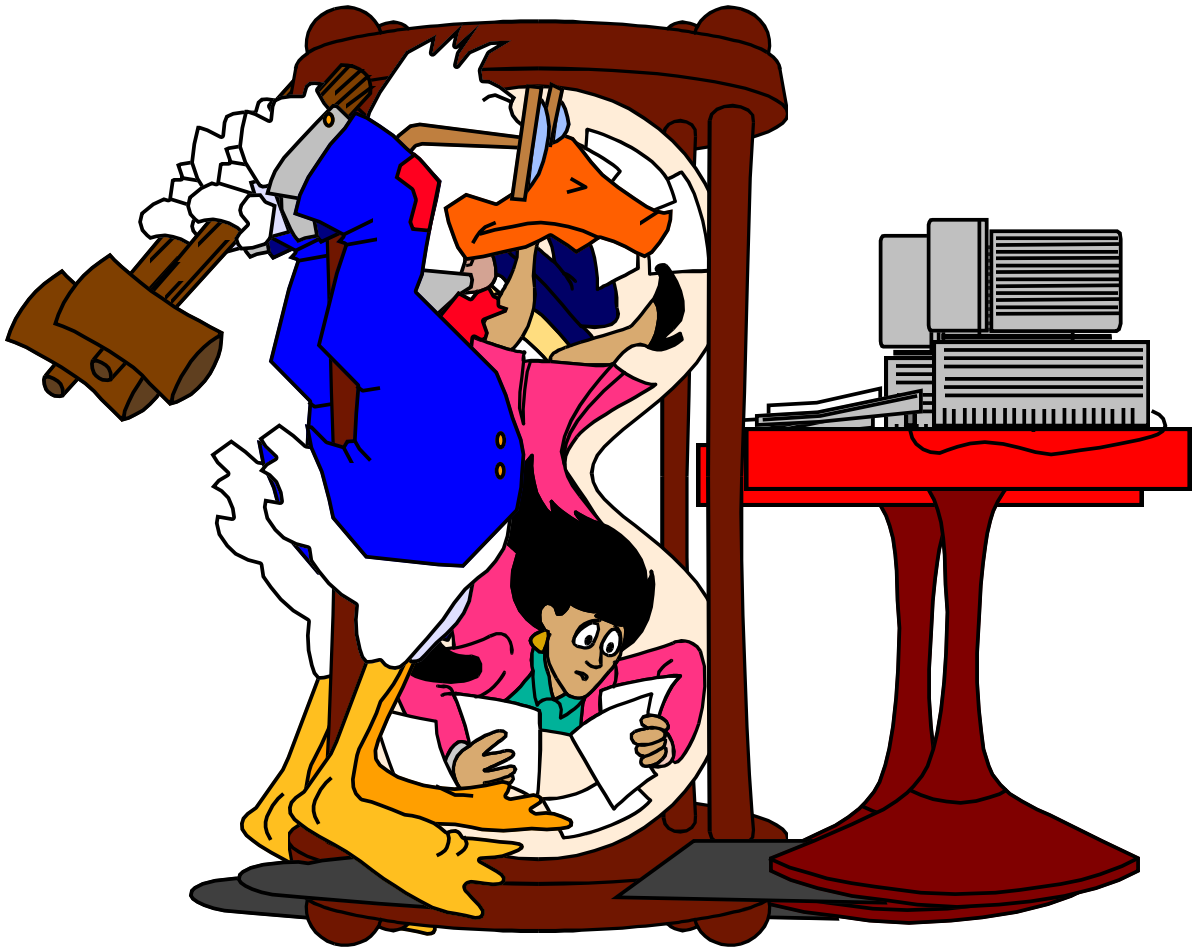
User can also review allergies/health issues before entering the order for the patient.



Taking actions on alert:

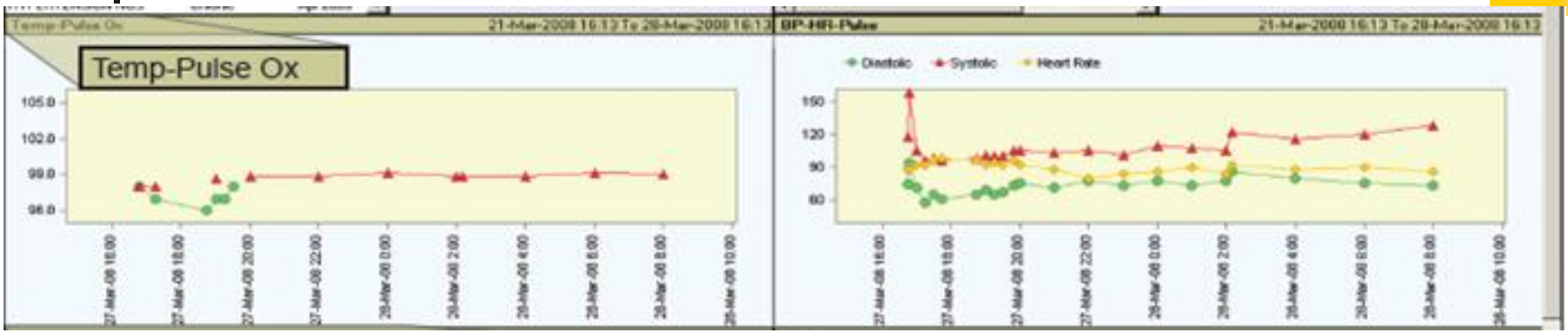
User can take actions on the alerts during the order entry process. The alerts can be duplicate order entry etc.

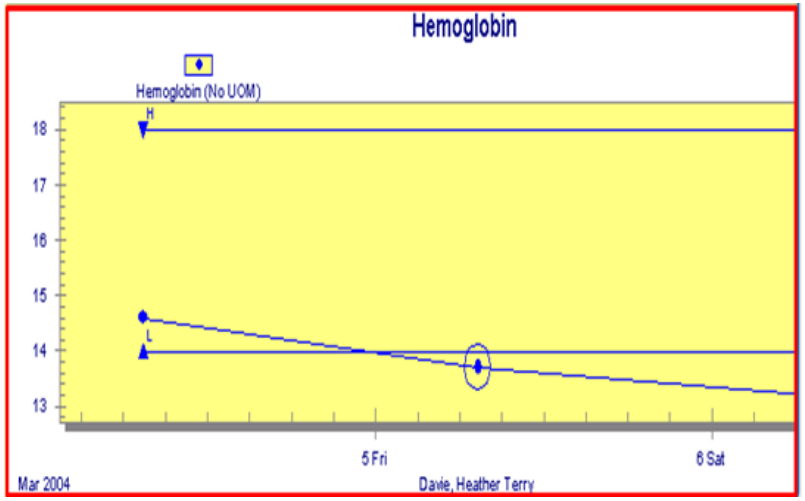
Give Me That Message NOW!
Not to my pager in 30 seconds!



Trend Analysis

Patient Health Trend Analysis





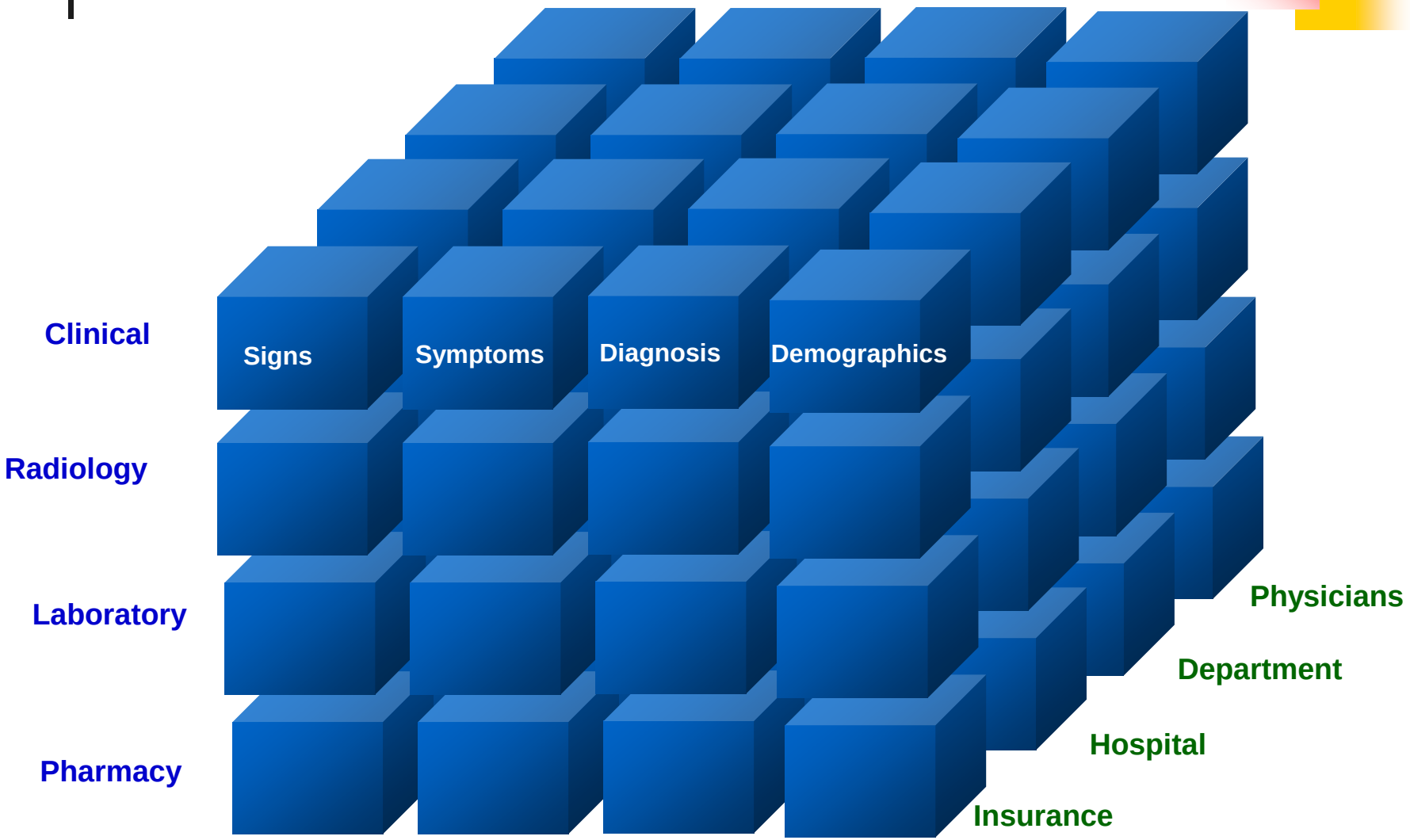
The Clinical Summary provides a role-based view of current patient information.

Clinicians can drill down for more details in any area.

When users wants to view and compare numeric results, user can select Trend View from the display format list. This format displays results in a grid or spreadsheet format across time.

In the trend view, user can also view the results in the graphical format.

Data Analytics: Outcomes of previous similar cases can help in determining the prognosis of the case at hand. The clinical decisions are based upon evidence of the past..

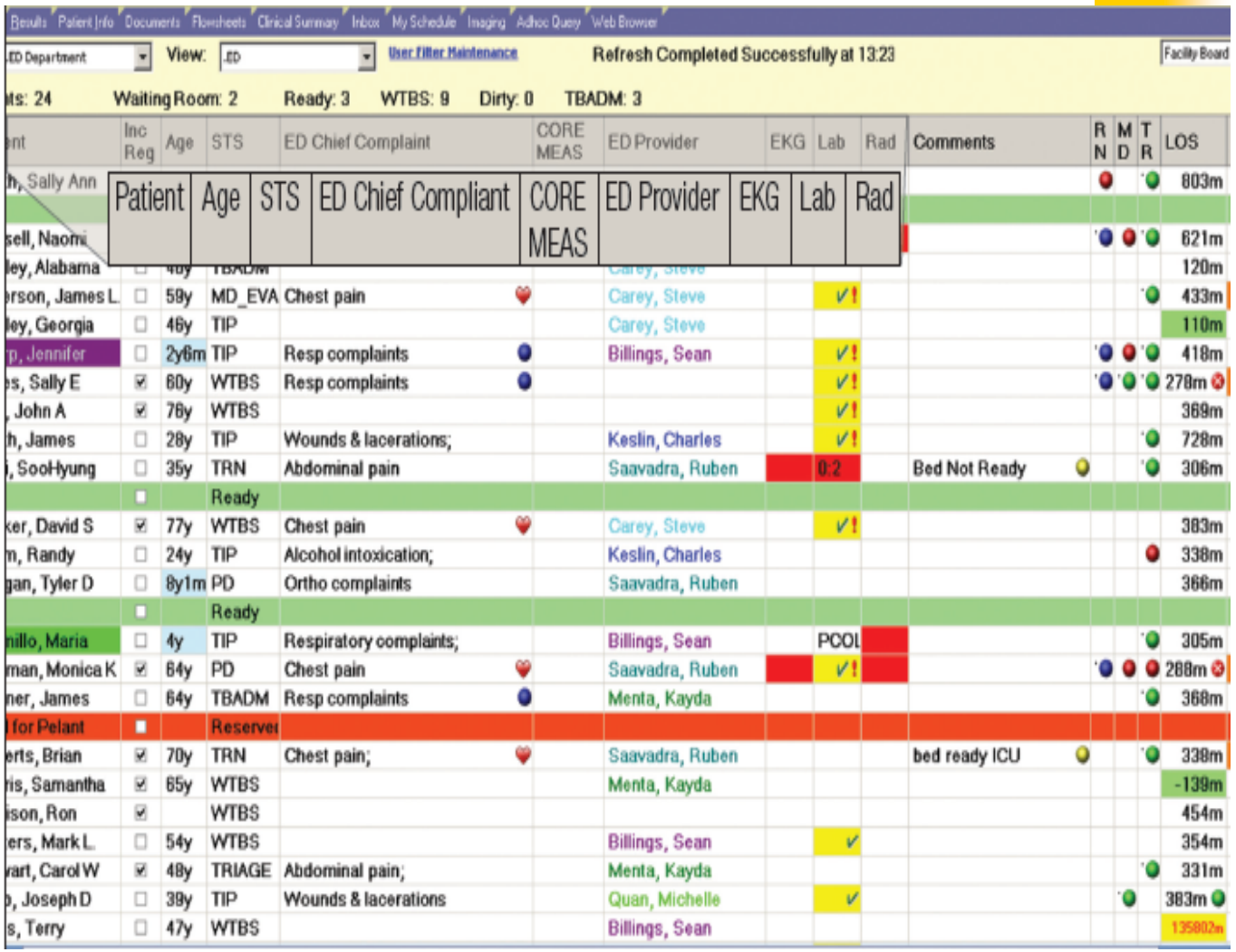


KPI - Dashboards

Emergency Department Dashboard

The interactive Tracking Board displays graphic and data-driven overviews of the entire emergency department to help clinicians prioritize care based on acuity and maximize bed utilization.

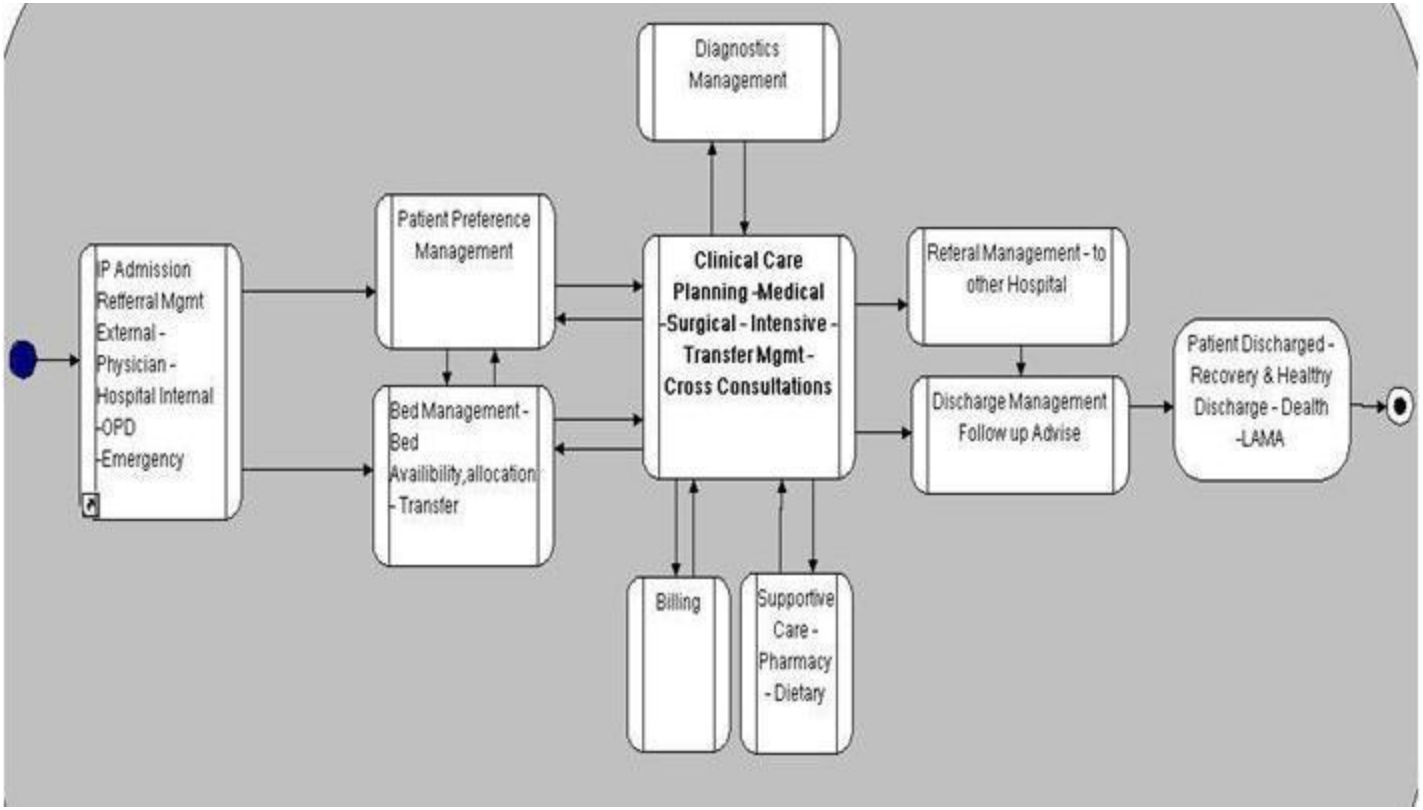
Tracking of critical time sequences and bottleneck alerting helps organizations meet their quality-improvement initiatives.



Inpatient KPI and Dashboards

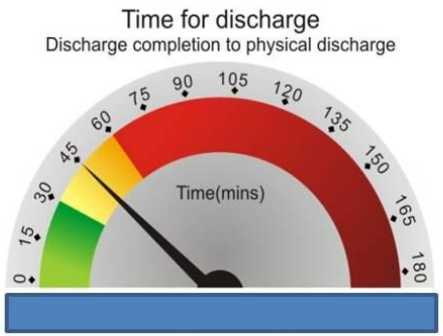
Every time the patient passes through any of the checkpoints a counter makes a count of the type of action. This can be rolled-up into a dashboard and presented to the decision maker.

Slicing and dicing of the data can be done based upon parameters such as diagnosis, demographics, time etc.



Dashboards lead to improved Outcomes

Dashboards can be created at Disease Level, Practice Level, Department level, Hospital Level, or even Region Level i.e. if the underlying data is integrated and available



Outcomes Examples-

- 82% increase in compliance for pain assessments
- 89% reduction in manual chart pulls
- 92% reduction in time responding to patient prescription requests
- 78% reduction in the number of formulary-related prescription requests
- 89% reduction in the number of refill-related prescription requests
- 91% reduction in the number of physician DEA-clarification requests

Public Health Informatics

Canada Health Infoway Blueprint

EHRS EHRS EHRS EHRS EHRS EHRS EHRS

Standardized Architecture

Standardized Data Vocabularies (encoding rules)

Standardized Data Structures

Standardized Interfaces

Standardized Functional Behavior

EHR SOLUTION **(EHRS)**

EHR INFOSTRUCTURE **(EHRi)**

Ancillary Data & Services

Health Information Data Warehouse

EHR Data & Services

Registries Data & Services

Longitudinal Record Services

Health Information Access Layer

Point of Service Application

Point of Service Application

EHR Viewer

EHR SOLUTION **(EHRS)**

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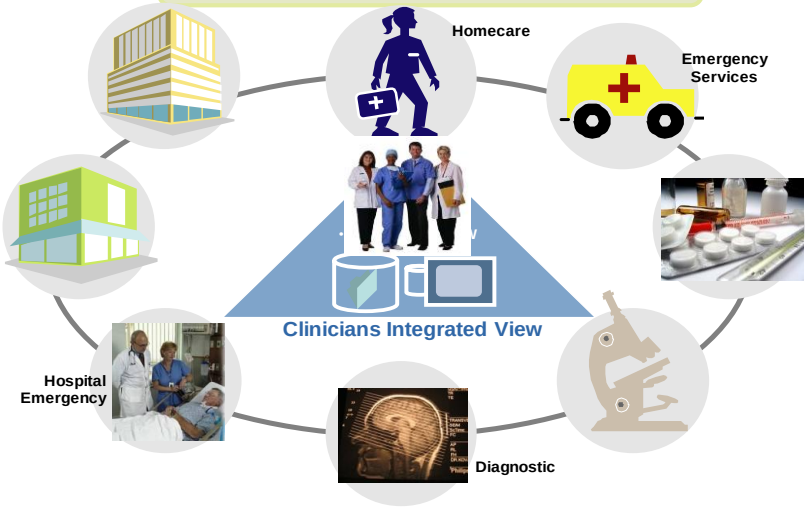
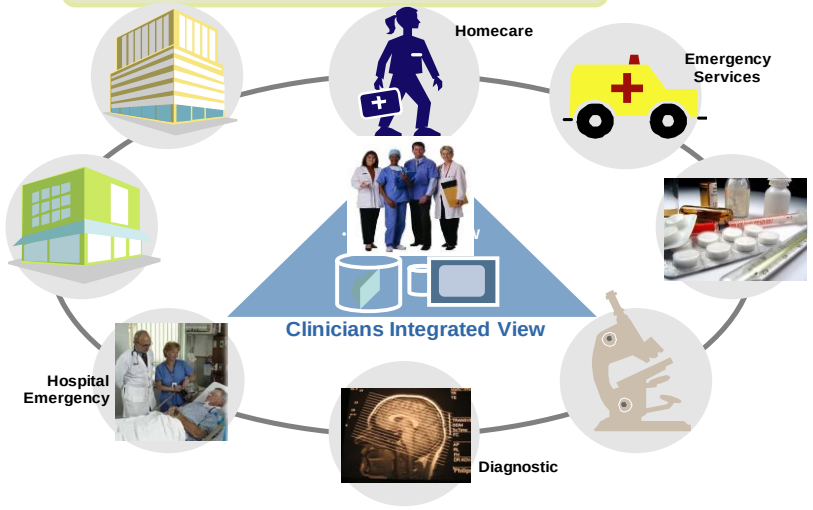
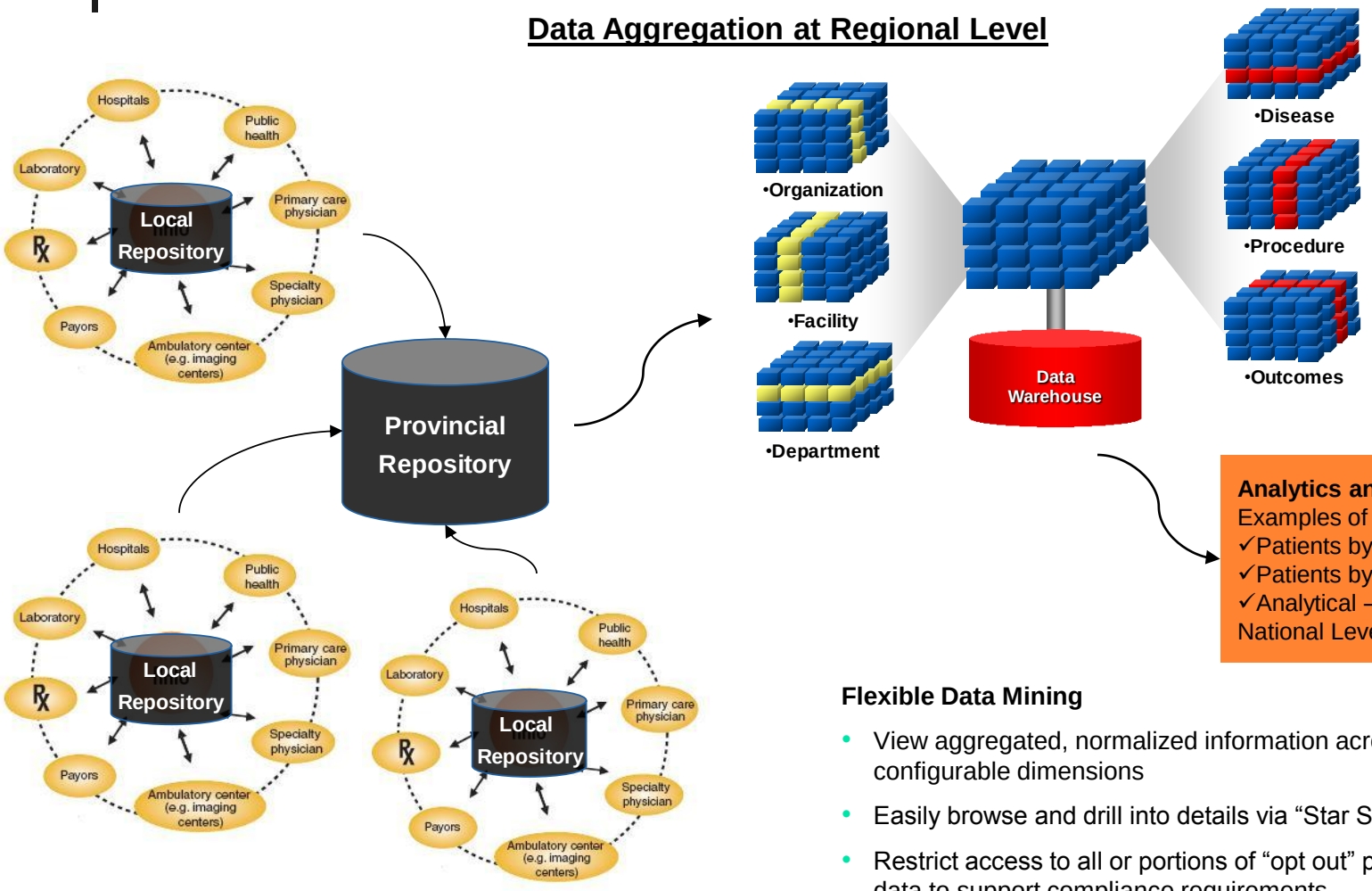
EHR Viewer





Epidemiological data analysis close the loop in public health decision making

Data Aggregation at Regional Level



Analytics and Reporting
Examples of Reports:
✓Patients by Symptoms
✓Patients by Disease
✓Analytical – Drill Down from National Level to Regional level

Flexible Data Mining

- View aggregated, normalized information across configurable dimensions
- Easily browse and drill into details via “Star Schema”
- Restrict access to all or portions of “opt out” patient health data to support compliance requirements

Solid foundation goes a long way...

Questions?

THANKS!

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