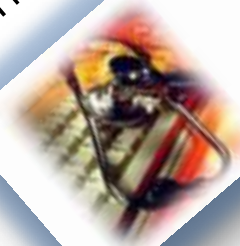




GSS (GREEN SAFE AND SMART) PRACTICES IN HEALTHCARE 2011  
SMART PRACTICES IN HOSPITAL – IT TRACK

## Closing The Loop in Healthcare



DR PANKAJ GUPTA  
PARTNER - TAURUS

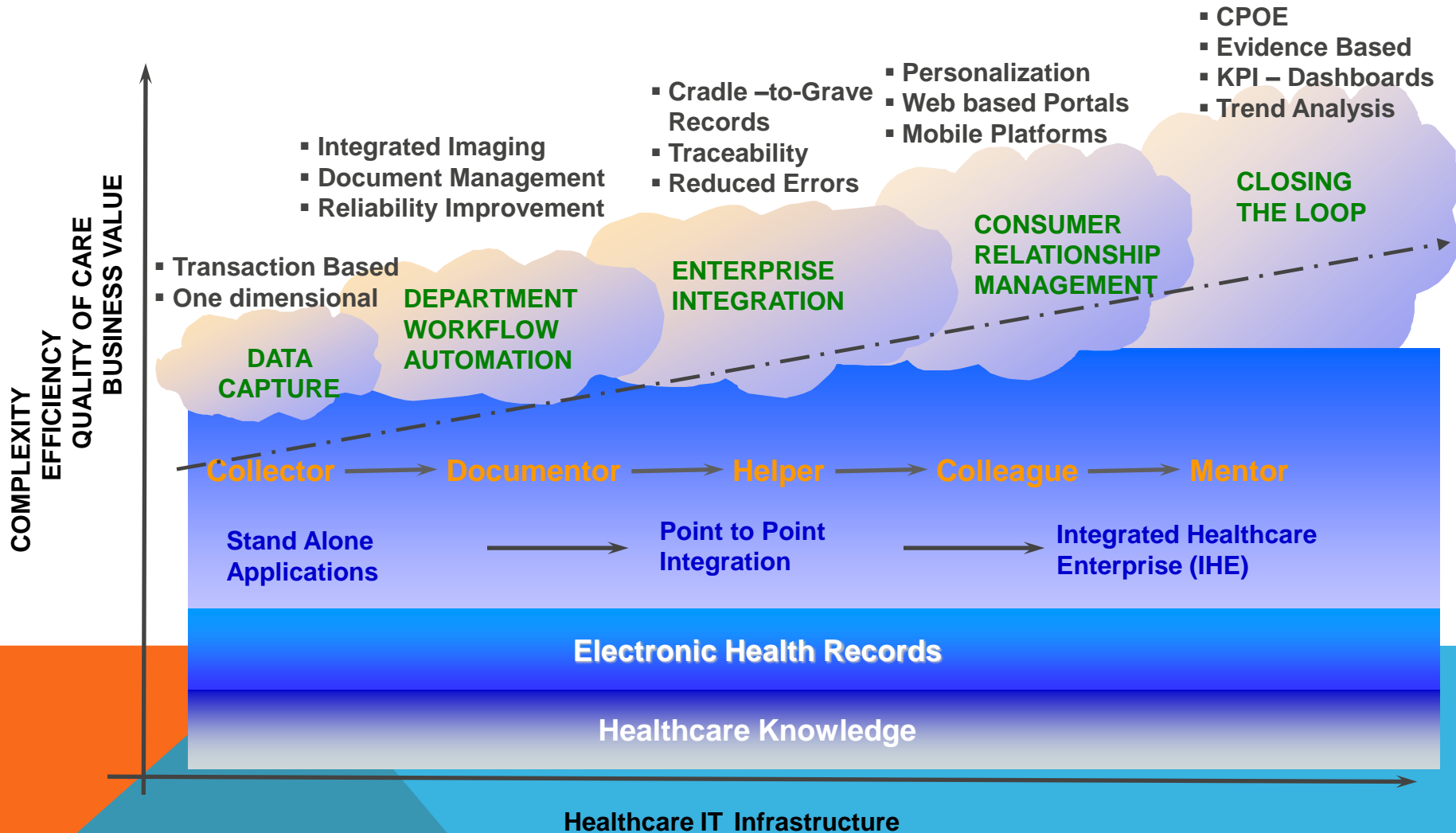
GLOCAL CONSULTING

16 July 2011

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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..



# BUSINESS INTELLIGENCE

**Decision Support**  
Rule based,  
Self Learning  
systems  
e.g. CPOE based  
EMR

**Statistical Analysis**  
Hypothesis  
dependent  
Bivariate/Multivariate  
Trend Analysis  
Tools – SAS, SPSS  
etc

**KPI Dashboards**

**Online Analytical  
Processing  
[OLAP] Tools**  
Multidimensional,  
flexible drill down  
and aggregation  
Tools – BO,  
Microstrategy

**Data Mining**  
Hypothesis  
independent  
Discovers hidden  
patterns in complex  
data sets



## CPOE: Patient Safety



# WHY CPOE?

1:57PM clinPark Rideout for diagnostic tests

NO. Dr. [REDACTED]

Di: hypoglycemia ✓  
 Activity: B/E ✓  
 Diet: Purified & corn sweet ✓  
 Inf: D<sub>5</sub> 45 @ 150cc/hr ✓  
 All: 94° ✓  
 Camp in a.m. ✓  
 Med: ASA 50mg po tid  
 Norvasc 5mg po qd  
 glimepiride 50mg po qam - hold  
 Simvastatin 50/20mg po tid  
 Mirapex 0.125mg po tid

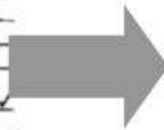
Date: 1/16/09 Time: 02:00

Write clinical indication for diagnostic tests

Glucostat 10mg po qam - hold  
 Glucostat 5mg po qam - hold  
 Novolin N 22U SQ qam - hold  
 Novolin N 4U SQ qpm - hold  
 Ibuprofen 200mg 1-2 tabs po q4 pm  
 sliding scale Ins

251 - 308 = 44  
 301 - 350 = 64  
 351 - 400 = 84  
 7400 call MD  
 6:50 call MD

Date: 1/16/09 Time: 02:37



CareSet - Hip Fracture Post-Op Order Set

Component	Order Details
<input checked="" type="checkbox"/> Adult Patient	T.N. Full Adult, General Med/Surg/Specialty
<b>Activity</b>	
<input checked="" type="checkbox"/> Weight Bearing	T.N.
<b>Clear Liquid Diet</b>	T.N.
<input type="checkbox"/> Nursing Communication Order	T.N. Advance to General Diet
<input type="checkbox"/> Nursing Communication Order	T.N. Advance to 2 Grain Sodium Diet
<input type="checkbox"/> Nursing Communication Order	T.N. Advance to 1900 kcal ADA Diet
<b>Medication</b>	
<input type="checkbox"/> acetaminophen (Anacet)	1 gm. NPO, Q8H, T.N. 3 tabs
<input type="checkbox"/> clonazepam (Klonopin)	600 mg. NPO, Q8H, T.N. 2 tabs
<input checked="" type="checkbox"/> Warfarin (Coumadin) Protocol	T.N. Right click on order and select Reference Manual to see Warfarin Dosing Monogram
The Warfarin 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 at 3 doses.	
<input checked="" type="checkbox"/> morphine	2 mg IV, Q2H, PRN, Pain, T.N. Prior to administration assess BP, HR, RR, level of sedation and opioid tolerance of patient
<input checked="" type="checkbox"/> morphine	5 mg IV, Q2H, PRN, Pain, T.N. Prior to administration assess BP, HR, RR, level of sedation and opioid tolerance of patient
<input checked="" type="checkbox"/> morphine	10 mg IV, Q2H, PRN, Pain, T.N. Prior to administration assess BP, HR, RR, level of sedation and opioid tolerance of patient
<input type="checkbox"/> tramadol (Rexall)	15 mg. Oral, Q 4hr, PRN, Sleep, T.N.
<input type="checkbox"/> tramadol (Rexall)	30 mg. Oral, Q 4hr, PRN, Sleep, T.N.
The acetaminophen/ibuprofen 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.	
<input checked="" type="checkbox"/> acetaminophen/ibuprofen (Lunesta 500/5)	1 tab. Oral, Q2H, PRN, Pain, T.N. Prior to administration assess BP, HR, RR, level of sedation and narcotic tolerance of patient
<input checked="" type="checkbox"/> acetaminophen/ibuprofen (Lunesta 10/50)	1 tab. Oral, Q2H, PRN, Pain, T.N. Prior to administration assess BP, HR, RR, level of sedation and narcotic tolerance of patient
<input checked="" type="checkbox"/> acetaminophen (Tylenol)	650 mg. Oral, Q4H, PRN, Headache, T.N.
<input type="checkbox"/> PCA Order Set	
<input checked="" type="checkbox"/> ibuprofen (Ibuprofen 5)	1 tab. Oral, BID, T.N.
<input checked="" type="checkbox"/> magnesium hydroxide (Philo Milk of Magnesia)	30 mL. Oral, PRN, Constipation, T.N.
<input checked="" type="checkbox"/> docusate (Dulcolax)	10 mg. Rectal, Suppor, Daily, PRN, Constipation, T.N.
<input checked="" type="checkbox"/> acetaminophen (Tylenol)	650 mg. Oral, PRN, Temp over 38.5 C, T.N.
<input checked="" type="checkbox"/> acetaminophen (Tylenol)	650 mg. Rectal, Suppor, PRN, Temp over 38.5 C, T.N.
<b>ROUTINE</b>	
<input checked="" type="checkbox"/> HEMOGLOBIN	ROUTINE, T+1:000, Q24H + 2. day
<input checked="" type="checkbox"/> HEMATOCRIT	ROUTINE, T+1:000, Q24H + 2. day
<input type="checkbox"/> Order the Piv Test if the patient is on Warfarin	
<input type="checkbox"/> PROTHROMBIN TIME	ROUTINE, TX, Q24H
<b>Readings</b>	
<input checked="" type="checkbox"/> PAIN PELVIS IV	STAT, T.N. Transport Mode: PORTABLE. Reason for Exam: Post-Op Hip Fracture. Proximal Femur affected hip, in PACU

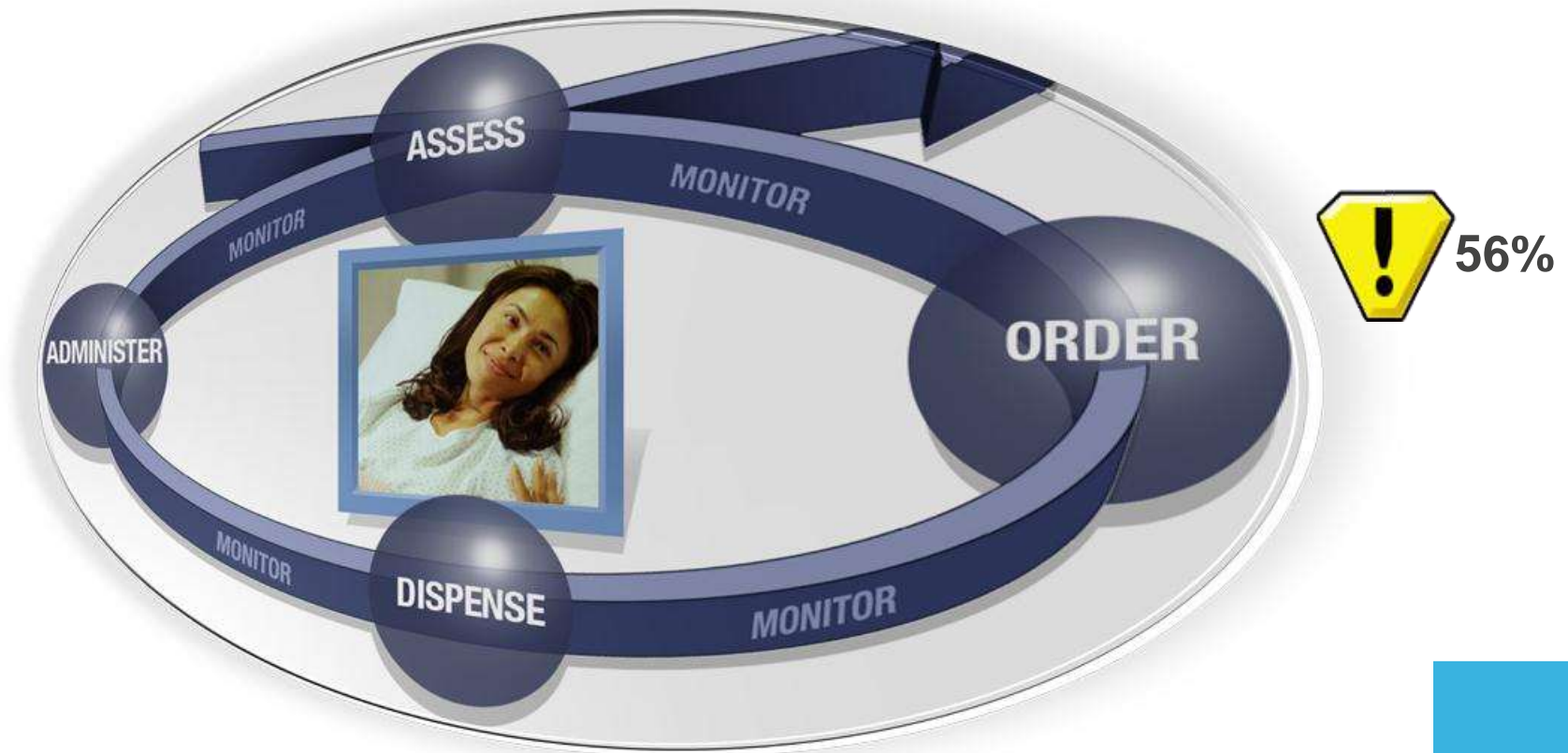
Order details | Order comments | Details

OK Cancel

# 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*



# 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

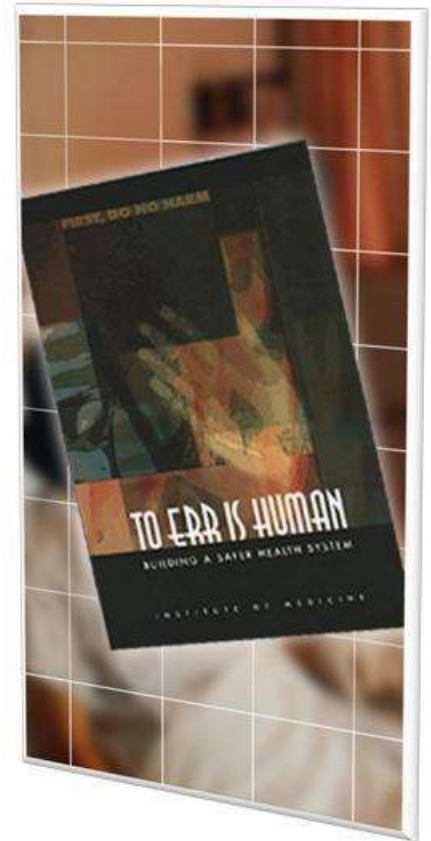
### Preventive

- 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



[www.leapfroggroup.org](http://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



# ORDER ENTRY – REVIEW ALLERGY/HEALTH ISSUE WHILE ORDERING

Order Entry Worksheet - MUNIAN, JANE Lillian

MUNIAN, JANE Lillian (Joan Ames MD)

Allergies: Drug: acetaminophen, gentamicin; Food: Shellfish

Requested By:

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

**Alert Summary**

Acknowledged	View	Alert	Priority	Type	Comment	Scope
<input checked="" type="checkbox"/>		Duplicate Order	LOW	WARNING		Chart

Alert: Duplicate Order

Message: Date: 23-Jun-2008 07:00  
Status: Pending

May be duplicate with:  
Sodium Level  
Date: 23-Jun-2008 07:00  
Status: Pending Collection  
Warning duplicate order - Your current order for Electrolytes includes the Sodium Level which has already been ordered for the same date and time.

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

# INTEGRATED CPOE COMPLIANT 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*



**GIVE ME THAT MESSAGE NOW!  
NOT TO MY PAGER IN 30 SECONDS!**

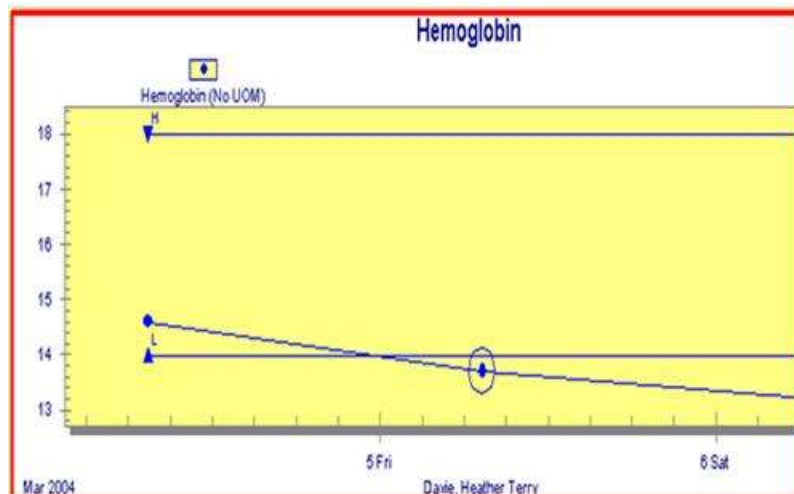
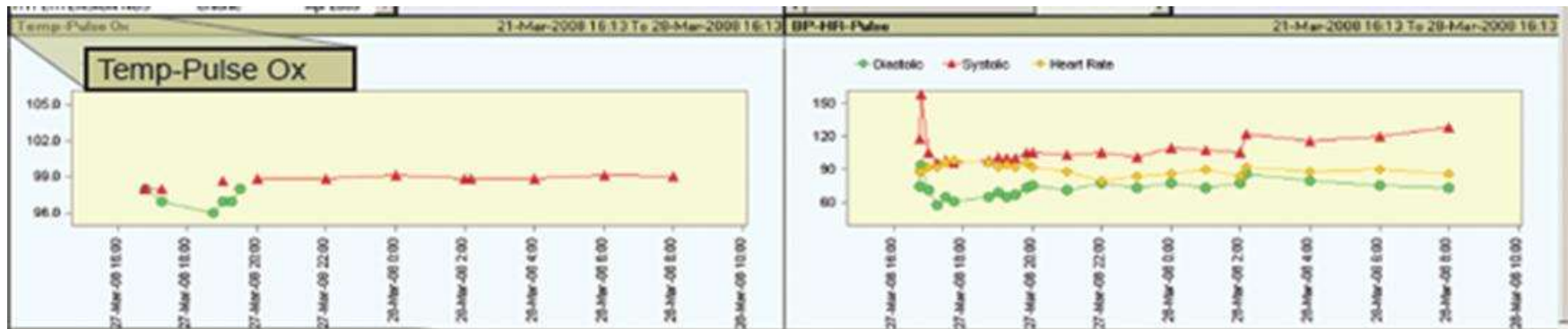




# Trend Analysis



# 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 want 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.

# TREND DASHBOARDS LEAD TO IMPROVED OUTCOMES

Trend Dashboards can be created across Diseases, Practices, Departments, Hospitals, or even Regions 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



# KPI - Dashboards

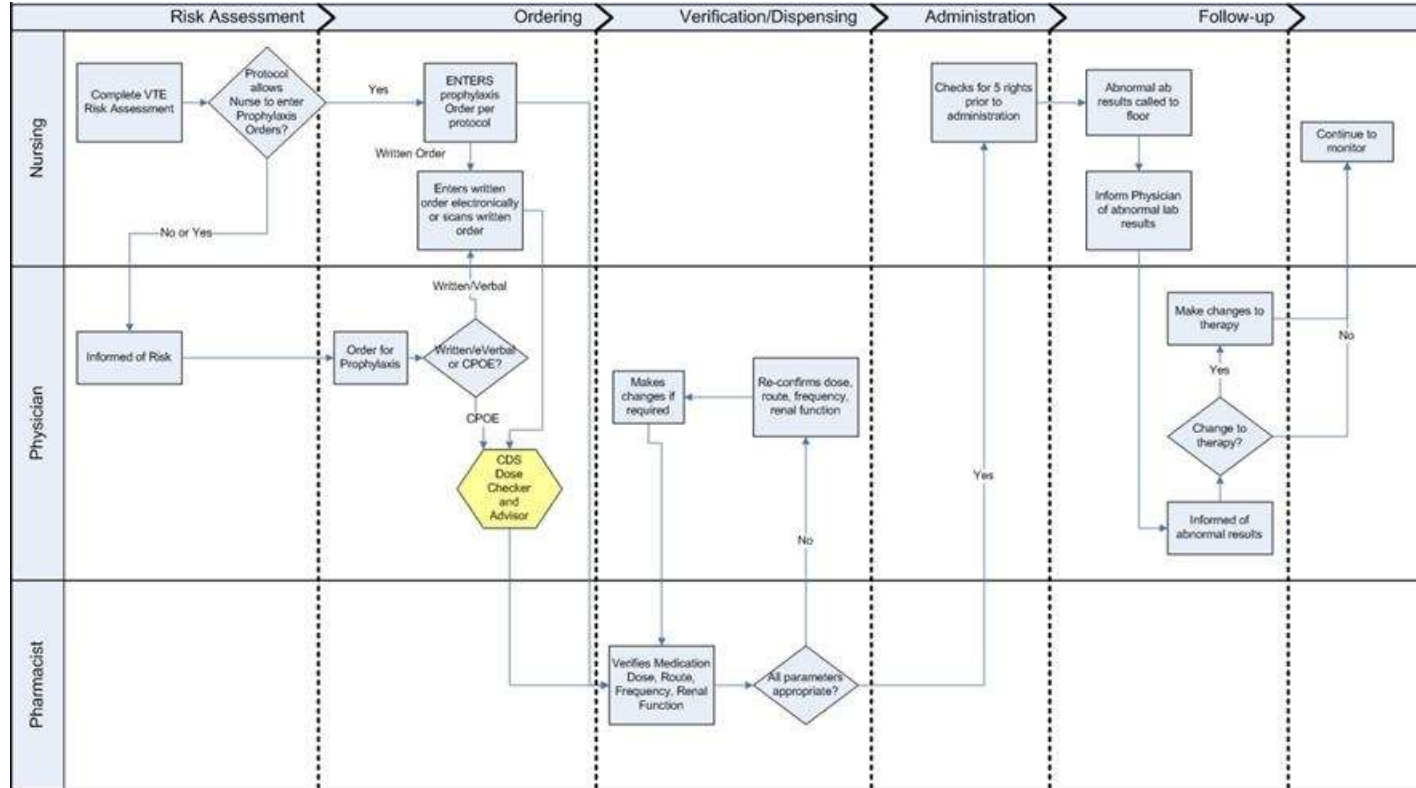






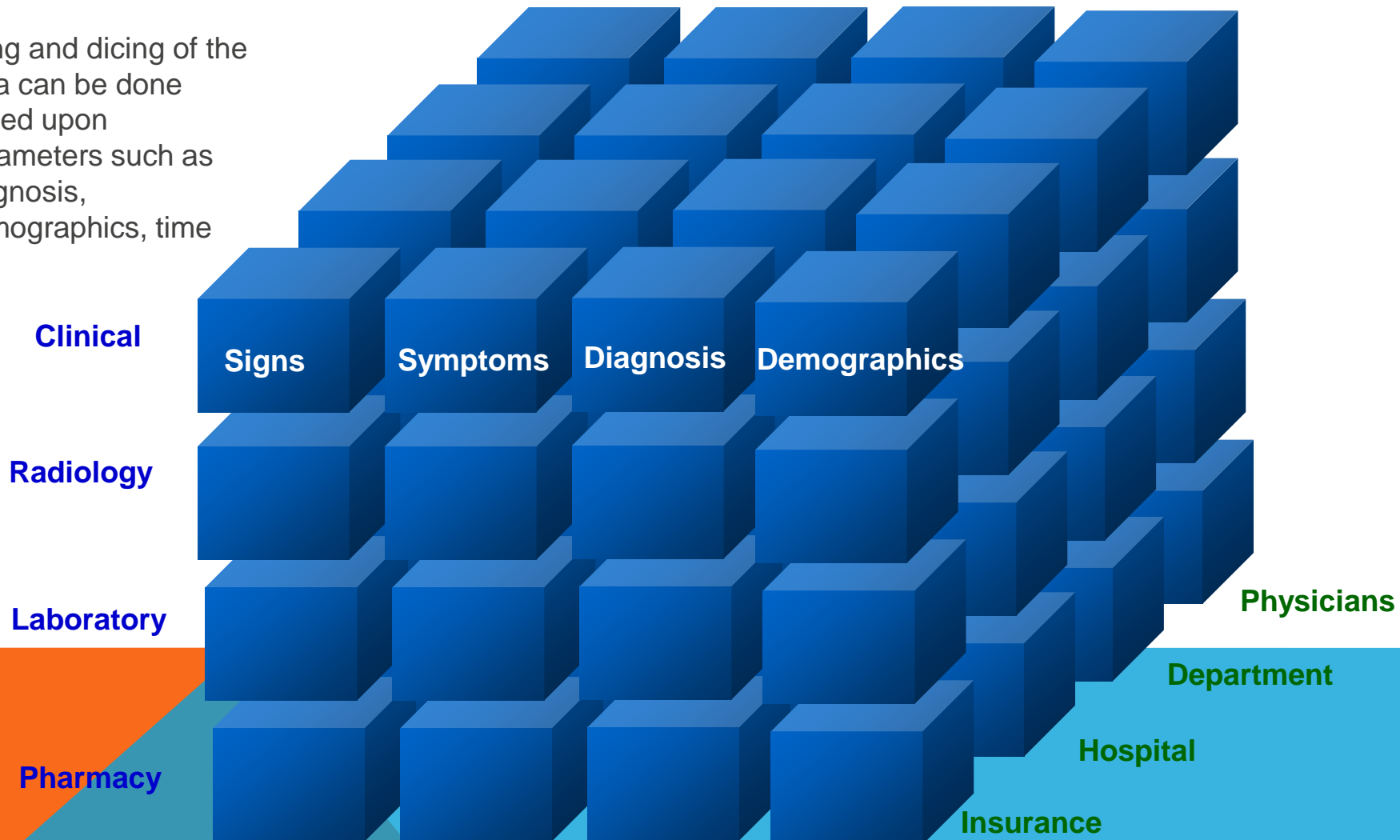
# INPATIENT KPI AND DASHBOARDS

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.



# EVIDENCE BASED MEDICINE: 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..

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





## BI Best Practices – US and Canada



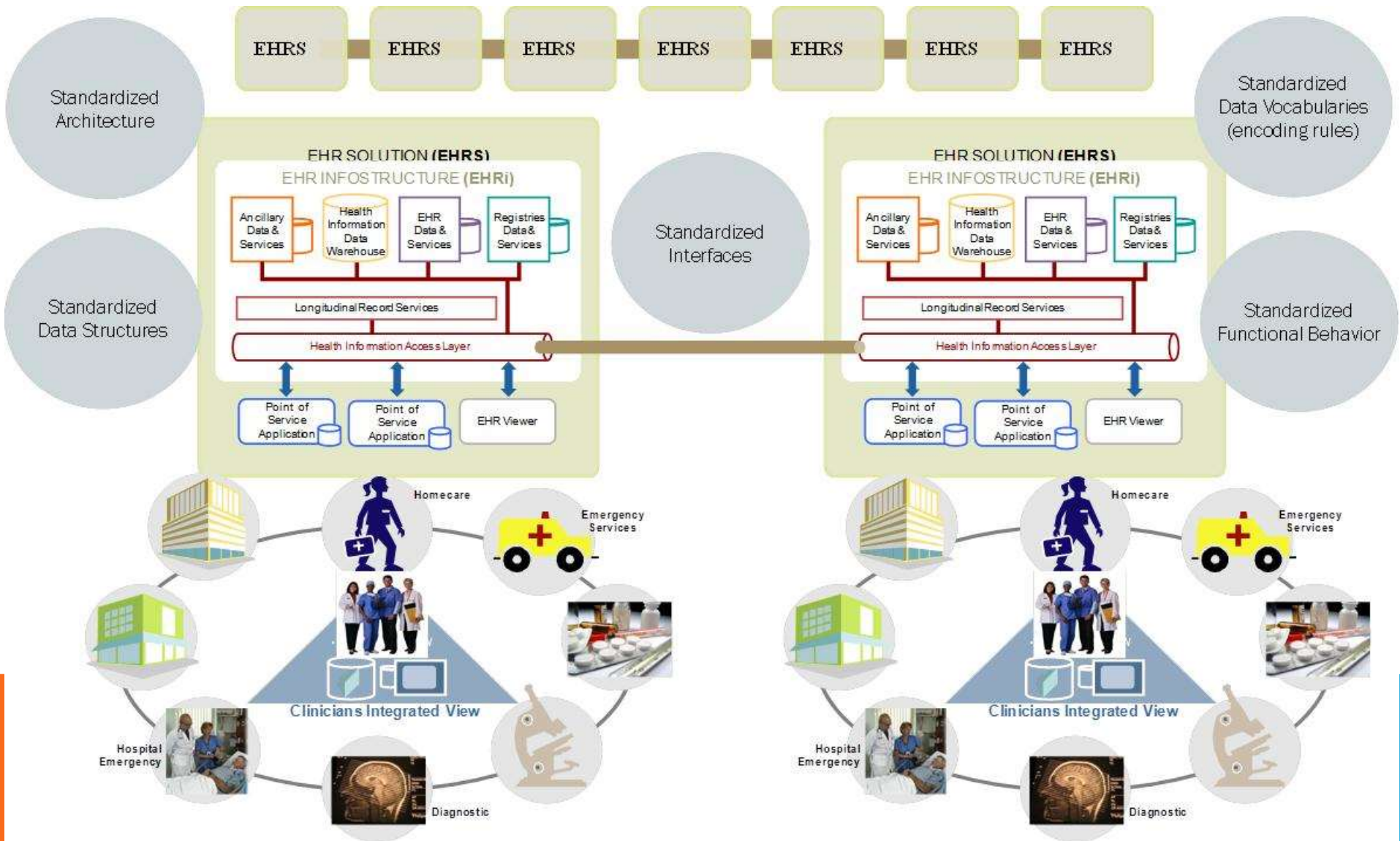
# MEANINGFUL USE

14 Mandatory KPI	Measures
Computerized provider order entry (CPOE)	>30% of patients have atleast 1 CPOE order
Drug-drug and drug-allergy interaction checks	Functionality is enabled
Record demographics	Functionality is enabled
Implement one clinical decision support rule	>50% of patients
Maintain up-to-date problem list	>80% patients have ICD
Maintain active medication list	>80% patients
Maintain active medication allergy list	>80% patients have allergy recorded
Record and chart changes in vital signs	>50% patients
Record smoking status for patients > 13 years	>50% patients, >13 yrs age, have smoking status recorded
Report hospital clinical quality measures	
Electronic Health record for the patients	>50% patients have PHR
Electronic discharge instructions	>50% patients have electronic Discharge summary
Capability to exchange key clinical information among providers of care and patient-authorized entities electronically	
Protect electronic health information	

# MEANINGFUL USE

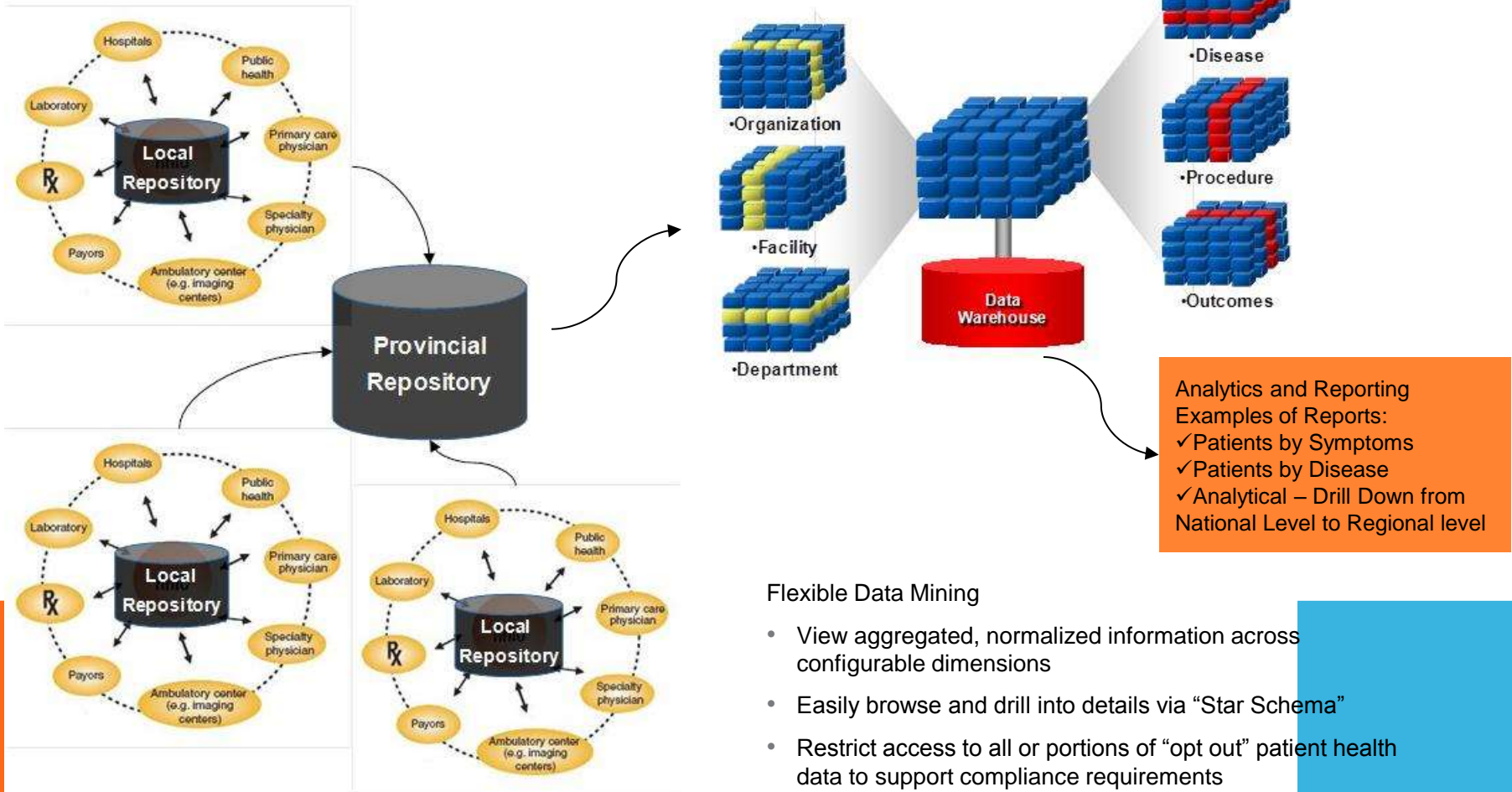
10 Optional KPI	Measures
Drug-formulary checks	Functionality is enabled
Record advanced directives for patients > 65	>50% patients, >65yrs age, have advance directive recorded
Incorporate clinical lab test results as structured data	>40% patients have lab tests results in EMR
Generate lists of patients by specific conditions	>80% patients have ICD
Use certified EHR technology to identify patient-specific education resources and provide to patient, if appropriate	>10% patients have been given patient-specific education
Medication reconciliation	>50% of transition of care should undergo medication reconciliation
Summary of care record for each transition of care/referrals	>50% patients transitioned out
Capability to submit electronic data to immunization registries/systems*	>80% patients - generate HL7 message for immunization
Capability to provide electronic submission of reportable lab results to public health agencies*	>80% patients - generate HL7 message for Lab results
Capability to provide electronic syndromic surveillance data to public health agencies*	>80% patients - generate HL7 message for ICD

# CANADA HEALTH INFOWAY BLUEPRINT



# EPIDEMIOLOGICAL DATA ANALYSIS CLOSE THE LOOP IN PUBLIC HEALTH DECISION MAKING

## Data Aggregation at Regional Level



### Flexible Data Mining

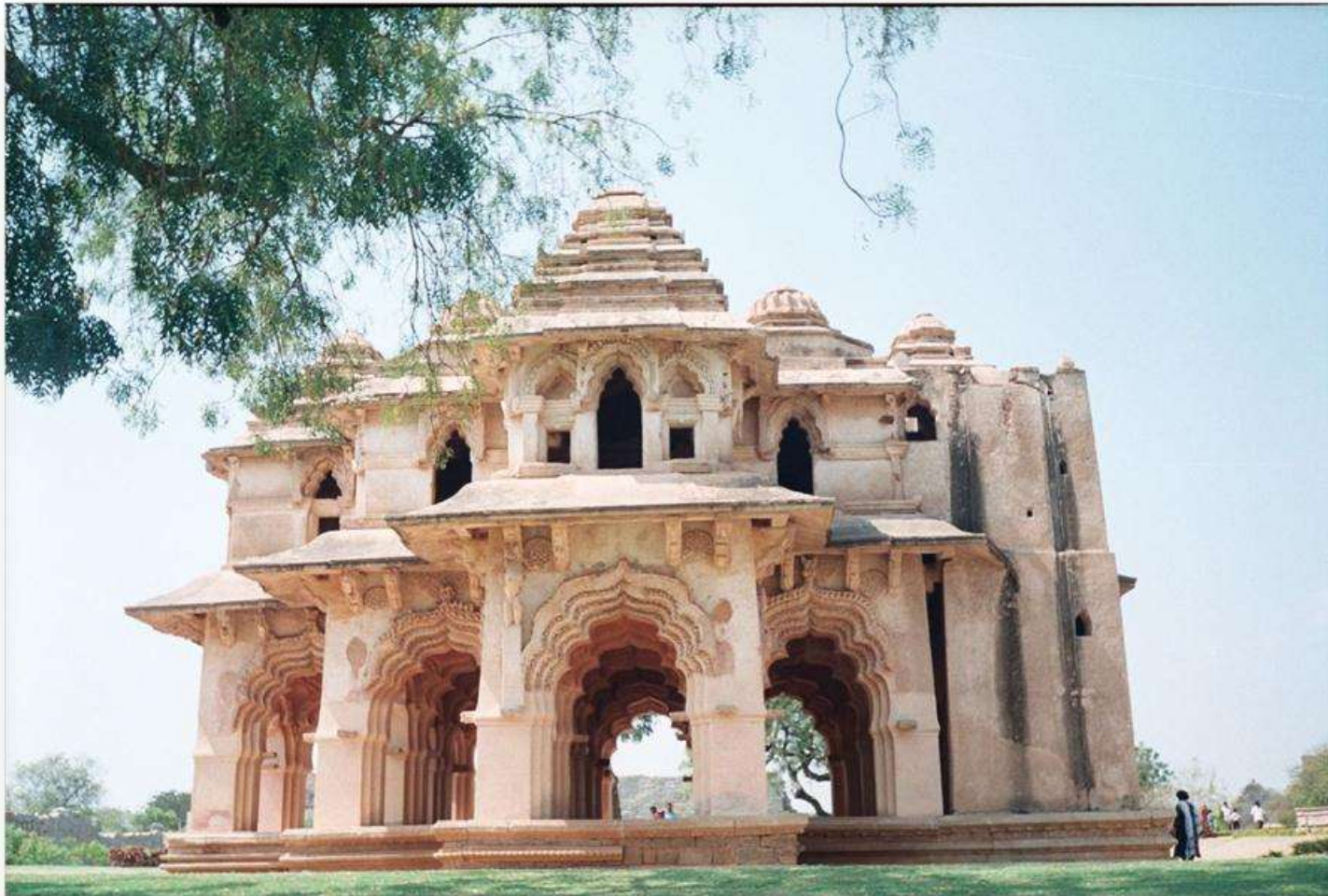
- View aggregated, normalized information across configurable dimensions
- Easily browse and drill into details via “Star Schema”
- Restrict access to all or portions of “opt out” patient health data to support compliance requirements

**SOON THESE SMALL STEPS WILL BE A MAMMOTH...**





**SOLID FOUNDATION GOES A LONG WAY...**



**HAMPI CITY built in 14<sup>th</sup> Century**

## QUOTE FROM MOTHER OF NURSING

“The effect on sickness of beautiful objects, on variety of objects and especially brilliancy of colours, is hardly to be appreciated. Such cravings are usually called the “fancies” of patients but these “fancies” are the most valuable indication of that which is necessary for their recovery. People say that the effect is only on the mind. It is no such thing. The effect is on the body too. Little as we know about the way in which we are affected by form and colour and light, we do know this: that they have an actual and physical effect. Variety of form and brilliance of colour in the objects presented to patients are an actual means of recovery”

- Florence Nightingale

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# Questions?

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