

Point of Care Testing: An Innately Lean Process

Jay B. Jones, PhD DABCC

Director, Regional Labs and Chemistry

Geisinger Health System, Danville, PA

What is “Lean”?

- Not an acronym
- Process efficiency defined and practiced by Toyota
- Process mapping from test(s) ordering to integrating the test result(s) into practice
- Improving the test process in terms of time, people, materiel, quality, outcome value
- Value stream mapping (removing waste)

POCT vs Core Lab “Lean”

- Patient centric
- Starts when the patient enters the door
- (Pre-, Post-) Analytical concurrent
- Single piece flow
- “Real-time” treatment integration
- “On the spot” clinically
- Specimen centric
- Starts when the specimen enters the lab
- (Pre-, Post-) Analytical sequenced in “legs”
- Batched
- “Re-queuing” required for treatment
- Remote clinically

POCT vs Core Lab “Lean”

- Test acuity pushes to POC (PT-INR, ABGs)
- Specimen prep pushes to Core Lab
- Turnaround time pushes to POC
- Instrument sophistication pushes to Core Lab
- Expense assessed for **total cost to treatment** may push testing to POC (**total process and value stream mapping**)

Top Ten “Lean” POCT Attributes

10. POCT consumes less paper and less space storing paper
 - No requisitions
 - No specimen labels
 - No worklists
 - No pending lists
 - No instrument printouts
 - An electronic “scientific record” is requisite for POCT

Top Ten “Lean” POCT Attributes

9. POCT performed on “fresh” patient specimen without processing of tube(s)
 - No specimen tube (assuming it’s the right one)
 - No centrifuge (space, noise, maintenance)
 - Fewer processing artifacts (temperature, changes with transport & storage time)
 - Closer to in vivo

Top Ten “Lean” POCT Attributes

8. POCT is mobile and easily deployed
 - Can deploy with clinical service & location
 - Can be shared between services & operators
 - Good backup system(s) for multiple locations
 - Can travel with patient (e.g. ECMO, neonate retrievals)
 - Rapid implementation and training

Top Ten “Lean” POCT Attributes

7. POCT is safer

- Specimen contained in test element
- POCT goes into isolation environment; no specimen comes out
- Less unused specimen to landfill or incinerator (Lean is Green)
- No broken tubes or aerosols

Top Ten “Lean” POCT Attributes

6. POCT consumes less patient specimen
 - Most of specimen is wasted from even 3 mL tubes
 - Fewer phlebotomy supplies
 - Blood conservation is key for neonates
 - Blood conservation is being considered for all patients

Top Ten “Lean” POCT Attributes

5. POCT improves turnaround time (TAT)
 - “Real Time” *in situ* Order Entry/Results Reporting
 - “Vein to Brain” TAT during encounter
 - Can be used selectively (e.g. trauma cases but not general ED)
 - POCT often only option because of timing & logistics

Top Ten “Lean” POCT Attributes

4. POCT is less expensive in many situations
 - Must account total process & total cost
 - Look for expensive clinic time savings (e.g OR time)
 - Improves patient compliance & hence lessens adverse outcomes
 - Avoids processing time & resources in lab
 - Clinic and patient may enjoy the “bang” for the lab’s POCT buck

Top Ten “Lean” POCT Attributes

3. POCT less likely to produce a medical error
 - Patient physically scanned (few mis-IDs)
 - Operator physically scanned
 - Few if any handoffs of requests/results
 - Critical results not delayed or lost
 - Medical procedures safeguarded (eg creatinine with interventional radiology)

Top Ten “Lean” POCT Attributes

2. POCT saves provider time & effort

- Convenient, Real Time Information to Information Overloaded Providers
- Less queuing up of previous patient encounter information
- Less CRT look up time & distraction
- Less brain drain to associate lab results to clinical situation
- Enables more timely and efficient clinical response

Top Ten “Lean” POCT Attributes

1. POCT enables integration of testing into clinical flow
 - “Single Piece Flow” with “choreography” into clinical process
 - More likely to influence treatment
 - Impact on clinical outcome amplified
 - Immediacy and proximity makes POCT a clinical tool like a stethoscope

Two Examples of “Lean” Thinking Applied to CPOCT

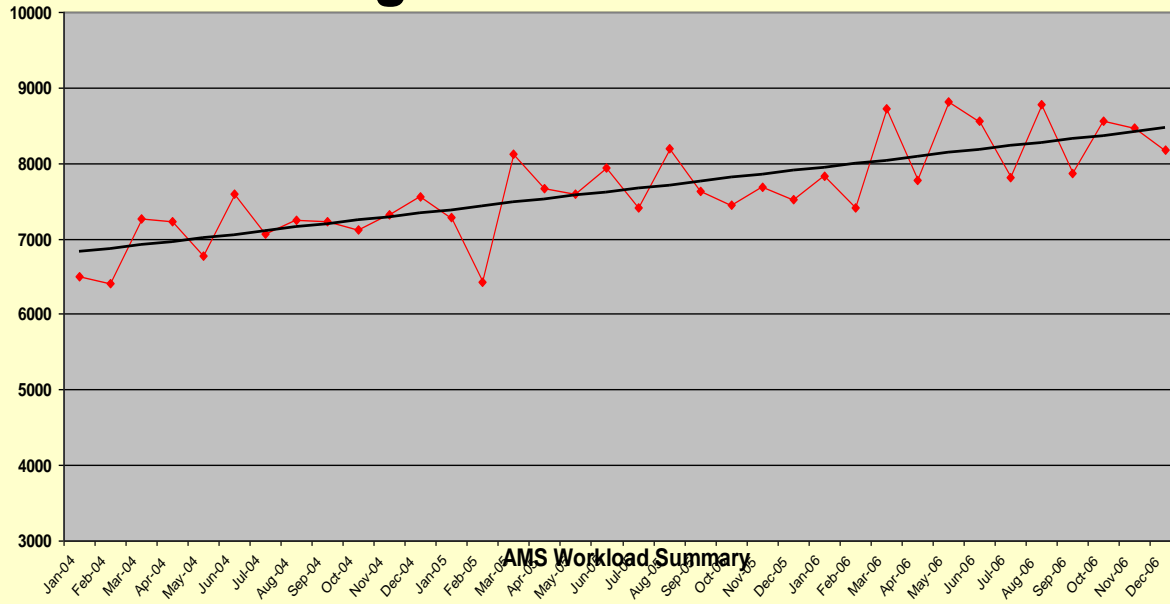
- Enterprise Anticoagulation Management Service (“Coag Clinics”)
- Enterprise Blood Gases (Whole Blood Chemistries) for CV Surgery

Geisinger Health System

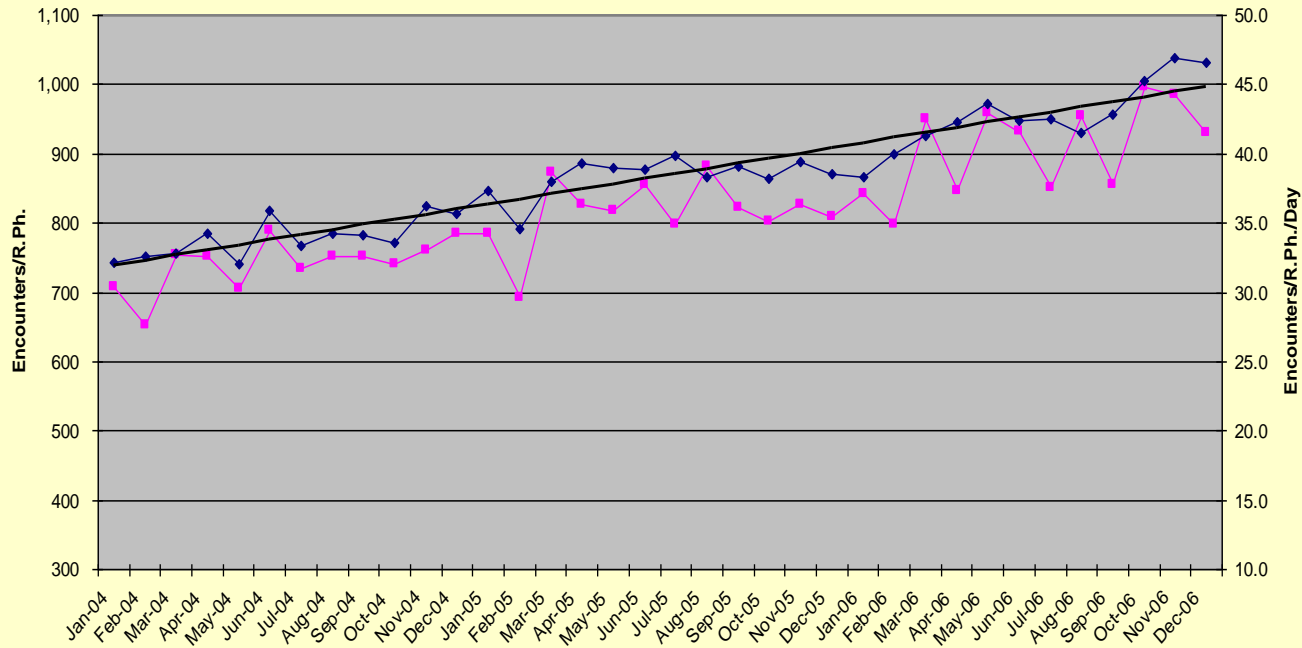
“Coag Clinic”

- 5,898 Active Patients; 16,762 Total Patients
- 8 locations staffed by pharmacists; CLIA certificates owned by System Lab
- ~8,000 Encounters per month
- 1.35 encounters per patient per month
- 175 – 200 new patients per month
- >1% per month growth rate
- 70% of INR's within Therapeutic Range

"Coag Clinic" Encounters



AMS Workload Summary



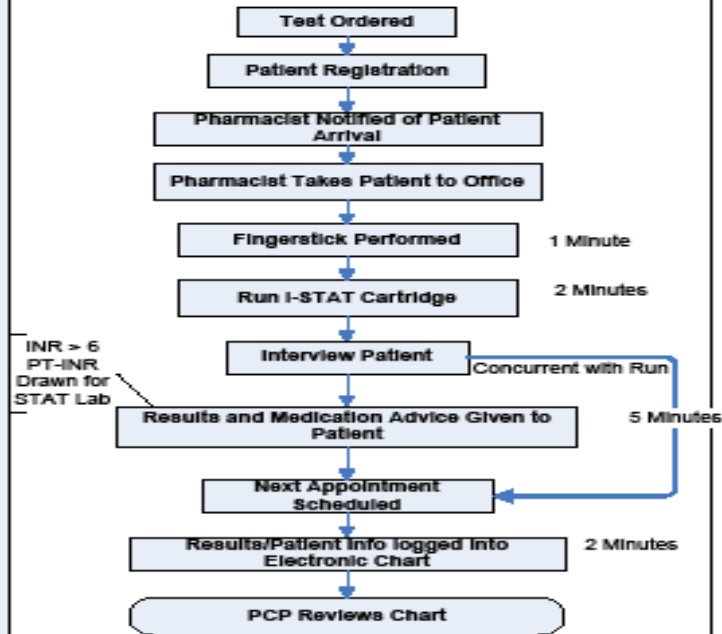
Encounter/R.Ph. Encounters/R.Ph./Day Linear (Encounters/R.Ph./Day)

7-10 Minute Patient “Coag Clinic” Visit

- Patient Registers in lobby (“Check in” at Kiosk)
- Pharmacist Sees Appt in EpicCare EHR
- Pharmacist Greets patient in waiting area
- Pharmacist Chats, gets patient history, Fingersticks
- Pharmacist matches patient “story” with PTINR result
- Pharmacist presents card with PTINR result, dose adjustment, next appt schedule to patient
- Any other questions? Bye.

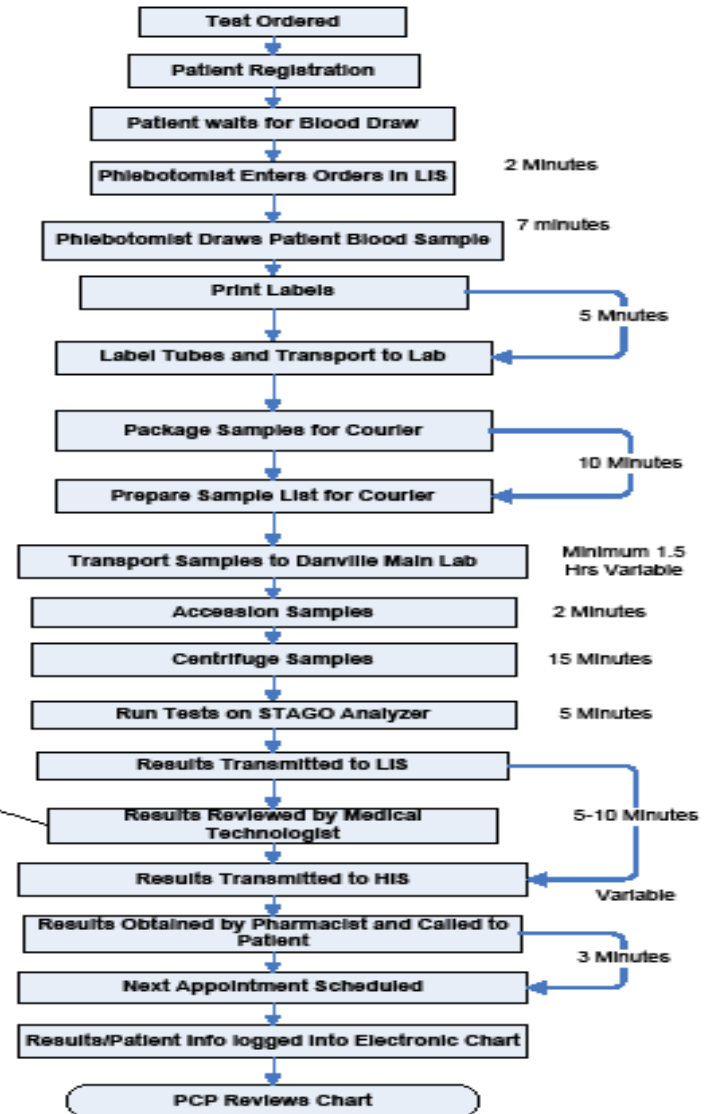
Side by Side LEAN Process Mapping: PT-INR

i-STAT (Coumadin Clinic)



Total Patient Encounter Time = 10 Minutes
Pharmacists See 25-35 Patients per Day

Stago (Danville Clinic)



Best Case Scenario Results to Patient within 6 Hours

“Lean” Tends to be Visual

make sure you get what your doctor prescribes.

1mg	2mg	2.5mg	3mg	4mg	5mg	6mg	7.5mg	10mg

For your protection, tablets are clearly marked with the COUMADIN® (Warfarin Sodium Tablets, USP) Crystalline name and dosage strength to help avoid confusion with your other medications.

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GHS WESTERN REGION ANTICOAGULATION CLINIC APPOINTMENT

DATE: _____ TIME: _____

**TO CHANGE APPOINTMENT CALL (717) 242-4275
MONDAY THRU FRIDAY 8:00 AM - 5:30 PM**

COUMADIN DOSE

SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
mg	mg	mg	mg	mg	mg	mg
tablets	tablets	tablets	tablets	tablets	tablets	tablets

RESULTS FROM _____

#A-750-213-F Rev. 11/07js INR _____ (GOAL _____ - _____)

Patients carry out next Appointment, Coumadin Dose, & PT-INR with goal

GHS Western Region Anticoagulation Clinic Appointment
 Date: _____ Time: _____
 To change appointment call 814-231-6240, Mon.-Fri. 8:00am - 4:30pm
 Toll Free: 1-866-248-1980

Coumadin Dose

Sun	Mon	Tue	Wed	Thu	Fri	Sat
mg	mg	mg	mg	mg	mg	mg
tablets	tablets	tablets	tablets	tablets	tablets	tablets

Results from _____
 Protime (PT): _____ seconds

INR _____ (GOAL - _____)

80-480-010-F Dev. 1/06hw

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Comparison of GHS Anticoagulation Management Service with Literature Incidence of Adverse Events

	GHS Clinics	Reference Anticoagulation Clinics (1)	Usual Practice (non-clinic Patients)*	GHS Non-Clinic Patients (2)
Rate of Bleeding	7.65%	8.10%	35.30%	17.10%
Rate of Thromboembolic Events	1.21%	3.30%	11.80%	20.60%

(1) Chiquette E, et al. *Arch Intern Med*. 1998;158:1641-1647

Incidence of Events per patient per year

(2) Based on 1997 GHS data - total of 228 patients on continuous therapy

Drug Therapy Compliance 2003

- “Coag Clinic” patient compliance
 - average compliance with warfarin therapy = 82.3%
 - Comparison <50%
 - 57.5% of patients had compliance rates of 90% or greater
 - Comparison <20%

Stroke Prevention

- 2235 patients were actively managed on anticoagulation therapy during calendar year 2006, with a diagnosis of A-Fib
- For each every 33 A-fib patients on anticoagulation therapy 1 stroke per year is avoided
- 68 potential strokes avoided during 2006

Stroke Prevention

- Cost per Acute Stroke approximately \$12,000 for initial event
 - \$816,000 annual cost avoidance
- Ongoing care costs are approximately \$3500 per patient per year
 - \$238,000 per patient per year cost avoidance
- Cost avoidance associated with stroke prevention more than pays for annual cost of the program

Lab's Role in "Coag Clinic"

- Provide/maintain instruments
- QC/PT/CLIA regulatory compliance
- Result reported through LIS to EHR, with billing of outpatient CPT revenue to lab
- Lab highly regarded senior leadership as providing integral patient service at POC
- Pharmacy gets most of the credit but they truly value and trust the lab

ABGs and Whole Blood Chemistries in the CV OR

- Anecdotal “15 minute TAT” from surgeons
 - Traditionally tracked In-Lab 2.5 min. TAT
- =====
- Observational process mapping in OR/lab
 - TAT study confirmed 15 min. TAT
 - Process improvements designed & prototyped
 - Information Technology updates being implemented
 - Rolling out process improvements to Enterprise

Lean Process Study “Kaisons”

- 15 min. TAT correct!
- CV OR clerical tasks distracting (incl POCT)
- Perfusionists need to stay with pump
- IT solutions needed
- Tube system inconsistent
- CV OR has enterprise team
- 5 min “Vein to Brain” Aim

Components of Turnaround Time from “Vein to Brain” (V to B)”

<u>A. CV-OR (min:sec)</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>
1) Specimen Collection	1:48	0:35	3:30
2) Test Ordering	1:44	0:53	3:05
3) Results Receipt	3:54	0:59	6:23
=====			
Total "V to B" TAT	15:23	12:12	22 :16
=====			
<u>B. Stat Lab (min:sec)</u>			
1) Specimen Receipt	1:41	0:31	3:41
2) Specimen Testing	0:36	0:20	1:16
3) Result Reporting	1:37	0:45	4:24
Total “In Lab” TAT	2:36	1:19	5:36
<u>C. Pneumatic Tube (min:sec)</u>			
1) Derived Transport Time	4:08	1:40	9:55

Efficient, Safe Order Entry

1. Patient Barcode



2. Syringe Barcode



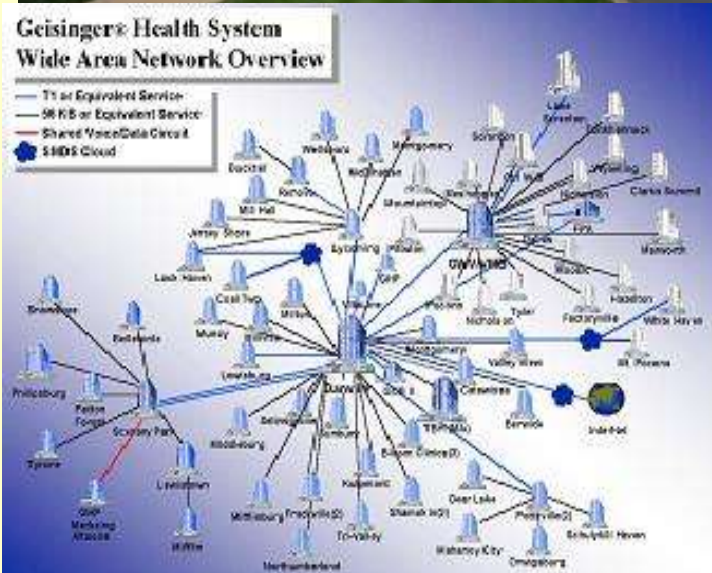
3. Operator Barcode

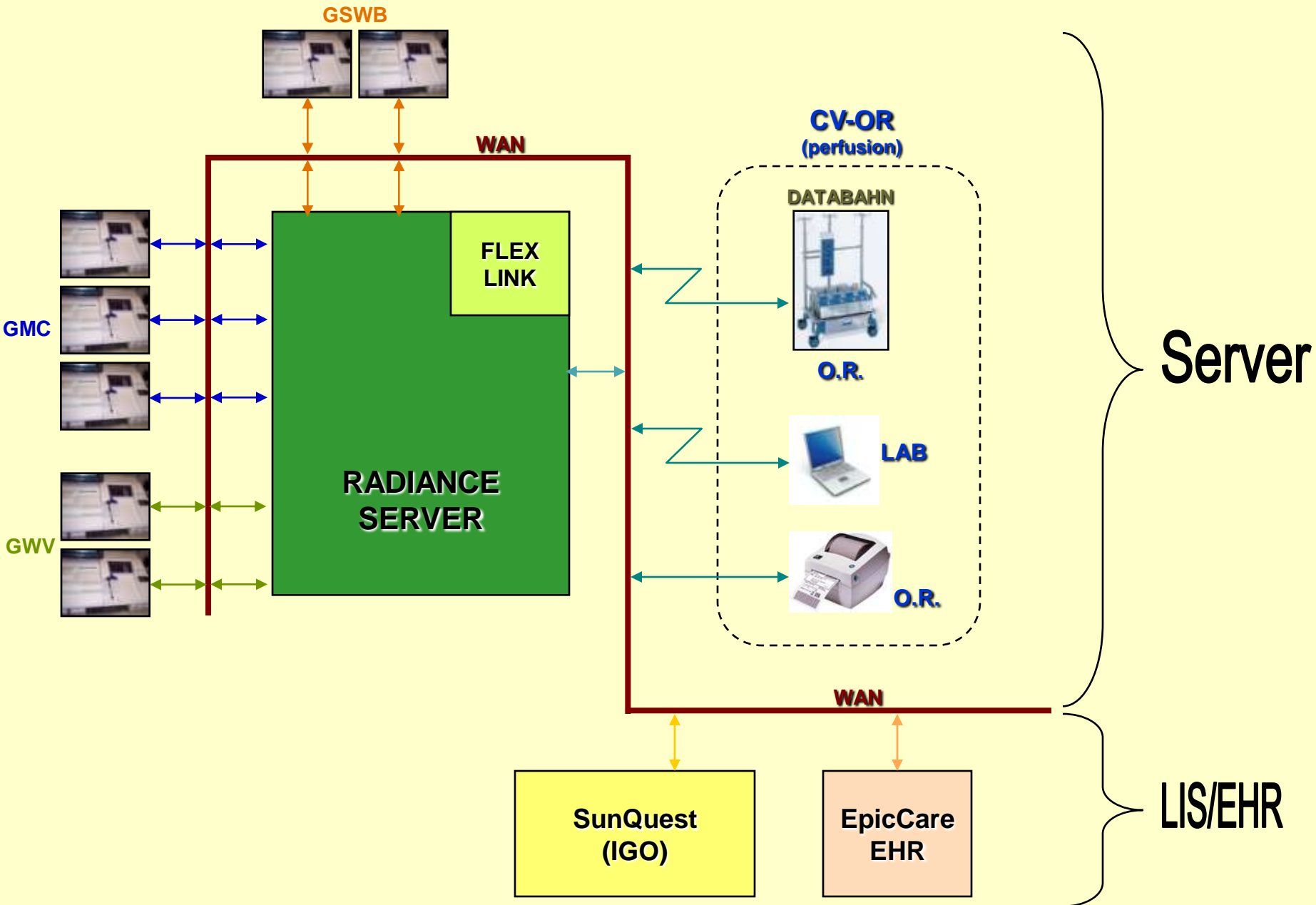


“Lean” Enterprise Informatics in GHS



- Single LIS (SunQuest) & EHR (EpicCare)
- Standardized Analytics, LIS test codes, lot #s, document control
- 28 “virtual” Client Server Enterprise apps from Lab alone





Conclusions & Suggestions

- Learn “Lean”
- Envision the Total Process that CPCOT supports
- Use “Lean” in your cost justifications for POCT technology procurement
- Appreciate how CPOCT is improving patient outcomes and brag (a little) about them!