

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
الْحَمْدُ لِلَّهِ الَّذِي
صَلَّى عَلَى مُحَمَّدٍ
وآلِهِ الطَّيِّبِينَ
وَأَسَدِهِ الْأَخِي
وَالْحَبِيبِ الْأَمِينِ
وَأَمَّا بَعْدُ
فَعَلَّمَ الْكَلِمَاتَ
الْحُسْنَى وَأَنزَلَ
الْقُرْآنَ الْعَرَبِيَّ
الْمُبِينِ



**TURN AROUND TIME AND POCT
IN CRITICALLY ILL PATIENTS**

PATIENT-CENTRED CARE



An Early Definition of POCT...

Tests done by *non-laboratory staff outside a recognized diagnostic laboratory*

This terminology replaces *Near Patient Testing (NPT)* as the favored term. Other terminologies include *Bedside Testing*, *Extra-Laboratory Testing* and *Disseminated Laboratory Testing*.

Today's POCT Definition

Care at the bedside and **anywhere** else the **patient** might be; or where decisions are made by a **caregiver**, **wherever** they may be.

*“It can be near the bedside, but it’s not always happening where you can run a wire....now, **wireless** has fueled this idea that clinicians truly are nomadic. Doctors now have **tools available 24/7 and the ‘anytime, anywhere’ network has become a reality.**”*

1500 B.C. Hindus in the Ayur Veda recorded that:

- **insects** and flies were attracted to the **urine** of some people
- this urine tasted sweet
Madhu Meha



- **1500 B.C. Egypt**
The Pharaoh's doctor noticed accumulation of **ants** around the **urine** of some people rather than others



Thomas Willis 1621-1675“..but in our age, given to good fellowship and guzzling down chiefly of wine, we meet with examples of this disease wherefore the *urine of the sick is so wonderfully sweet, or hath a honey taste...*”

Where it all began - 20 years ago?



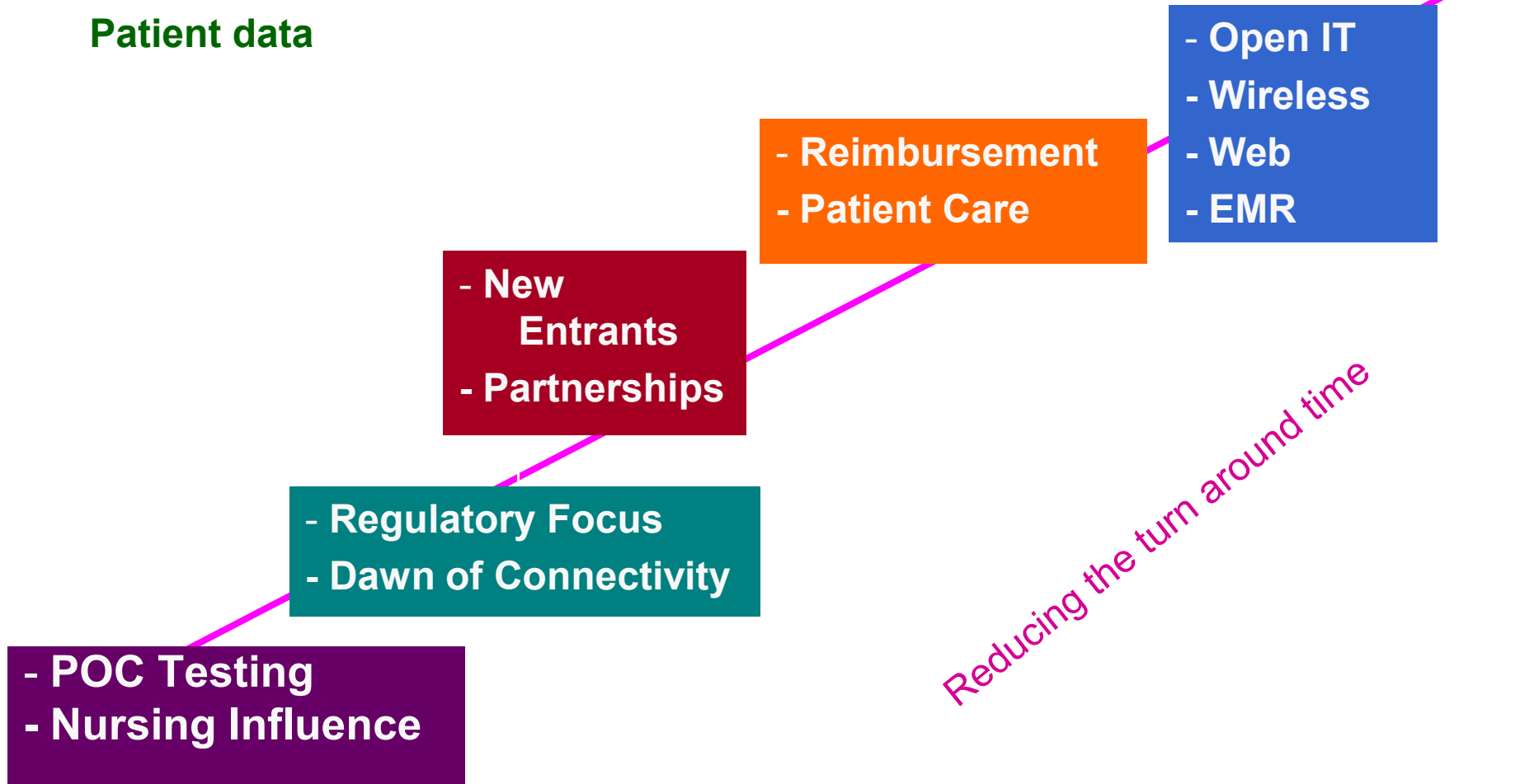
POC Evolution...

Data Collection

Patient data

Data Management

Information Management



Advantages of POCT

Early to mid 1990's

- Reduce turn around time (TAT)
- Reduce errors
- Reduce paper
- Smaller sample size
(microliters vs. milliliters)

POCT **Informatics** Tools for rapid patient lab data transmission

Early to mid **1990's**

- Bench-top analyzers
- Touch screen PCs
- Results sent to central laboratory for analysis



Science Center
Original Home of RALS
Technology

Early POC Informatics...

Mid to late 1990's

- Hand-held devices replace bench-top analyzers
- Laptops to collect device data
- Proprietary to analyzer or device vendor

The Dawn of Connectivity...

Late 1990's

- Shift to **electronic patient records**
- Incorporating POC results into the hospital **Data Management scheme**
- POCT Div. determined **connectivity** was the *biggest issue* facing its members

Enter Networks...

- Device 'docking stations' set up
- *Enhanced patient care*
- Patient tests **electronically sent** from floors to a central location and ultimately to the Lab Info System (**LIS**)/ Hosp info system (**HIS**)

In a Wireless Galaxy Far Beyond...

- Point-of-care technology and wireless networks fit hand-in-glove in health care and use of the networks are in vogue
- Wireless networks topped technology “wish list”
54% in 2002 -- 76% in 2004



POCT Can Now Be Anywhere...

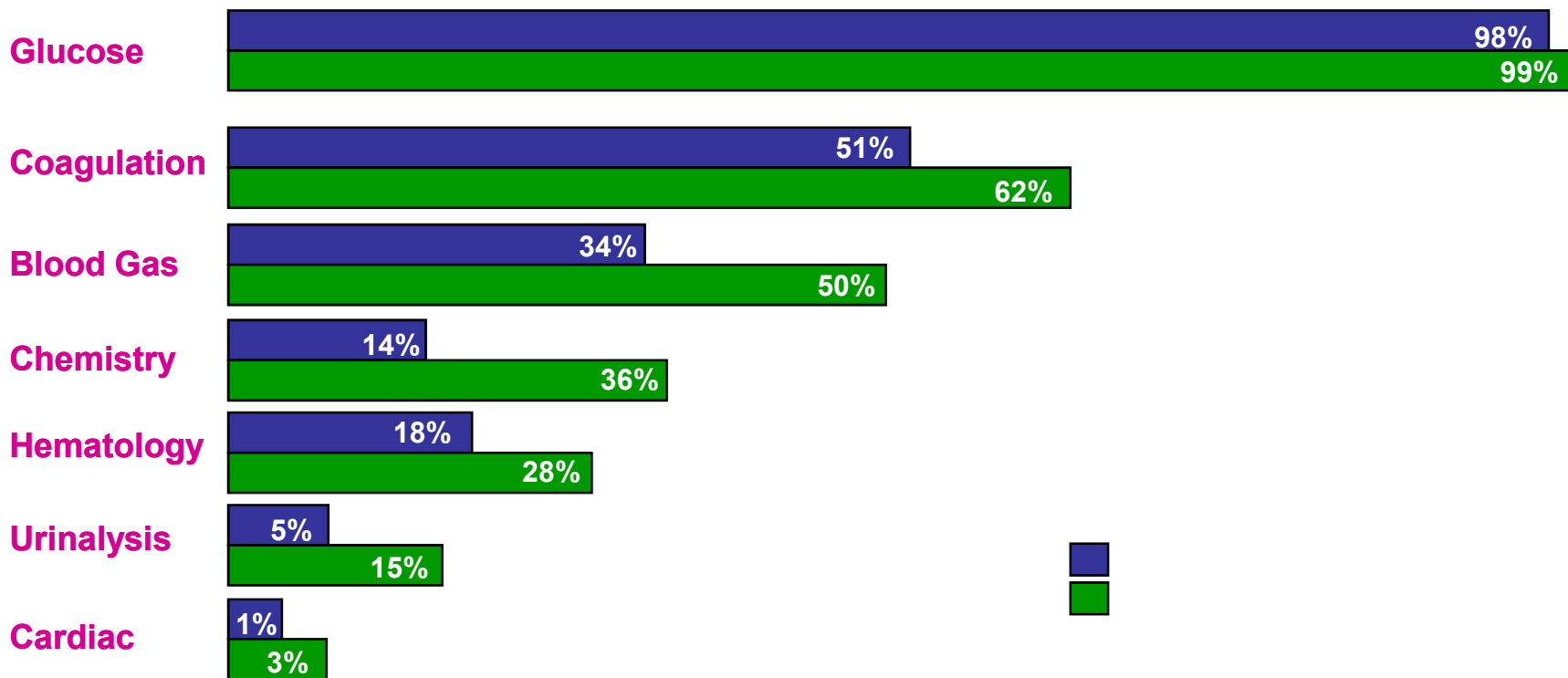
- **Wireless** networks and **mobile** hardware, provide clinicians with **broader access to patient data;**
- Technology advances could be *challenging the definition of “point of care.”*



Instead of clinicians going where data is, data is now going where the clinician is...

POCT is Not Just for Glucose!

% of Hospitals with POC Devices by Discipline



EXAMPLES OF POC TESTS

- Blood gases: pH, pCO₂ pO₂
- Na, K, Ca, Cl⁻
- Lactate; Glucose
- Urea, creatinine
- Cholesterol, TGs
- Troponin, CK-MB, myoglobin
- bilirubin
- Drugs of abuse
- Occult blood (faecal or gastric)
- **Urinalysis:** blood, albumin, hCG, ketones, glucose, leucocytes, pH, nitrite,
- CRP, Infections
- **Coagulation**
- **Haemoglobin/haematocrit**

POCT Sites

- Acute coronary care units
- Pharmacies
- Wards
- Emergency Room
- Intensive Care
- Respiratory Care
- Health Screening
- Long term care
- Nursing Home
- Homecare

POCT is here to stay and is growing because:

- It's becoming more 'attractive' to nursing and other healthcare personnel
- More tests are being added for POCT
- Vendors are continuing to support growth
- Technology is continuing to evolve

But...

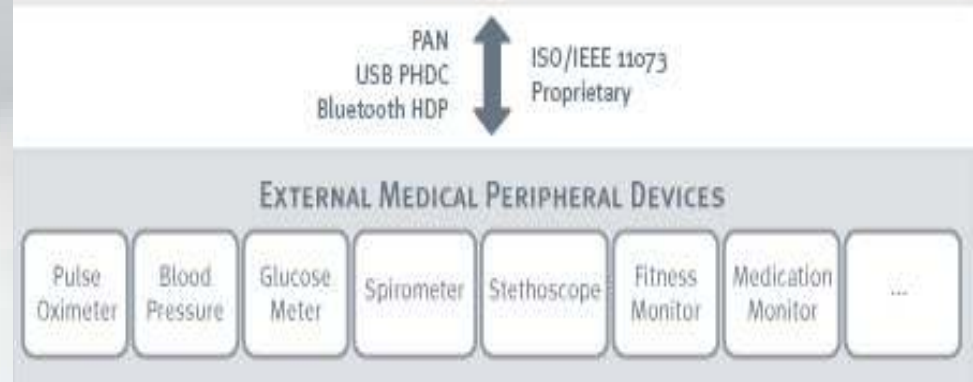
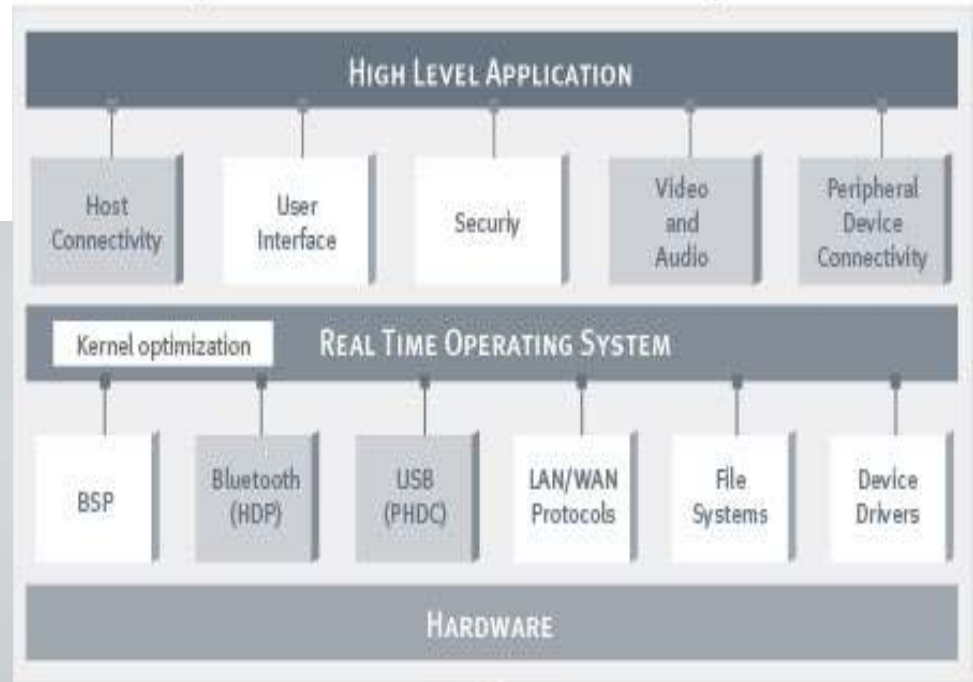
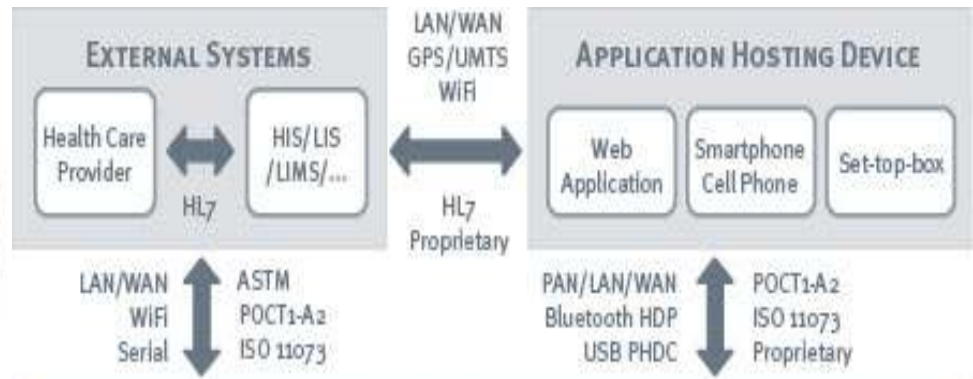
- *POCT is more than hardware & software...*



Integrated Pathology

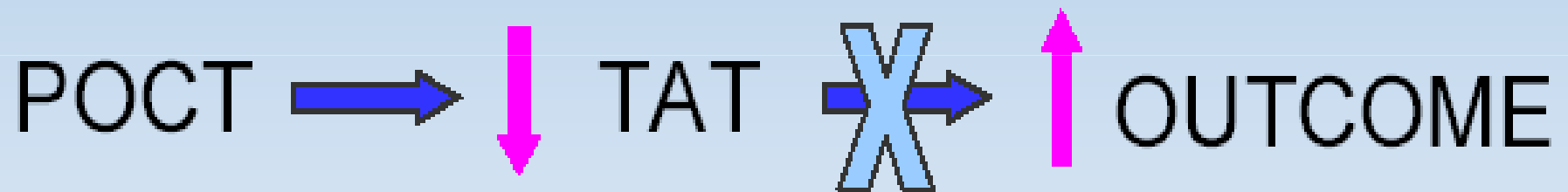
DEVICES





ASSUMPTION

often used in assessments of benefits of POCT



**NOT
NECESSARILY**



Speed

Quality



Speed

Quality

A 'connected' POCT service is required



The 'unknown unknowns'



No device or procedure
is foolproof!

SOME CLINICAL OUTCOME MEASURES IN POCT

Outcome Example

- **Faster decision** making Chest pain
- Starting **treatment earlier** Drug overdose
- Improved **compliance** with treatment Diabetes
- Reduced incidence of **complications** Diabetes
- Quicker **optimization** of treatment Anticoagulation
- Patient satisfaction, ownership of disease

“Faster is better - *It's rarely that simple!*”

The available data shows *that laboratory TAT was not the rate-limiting factor*



‘So I said...
“How long have
I got Doctor?”

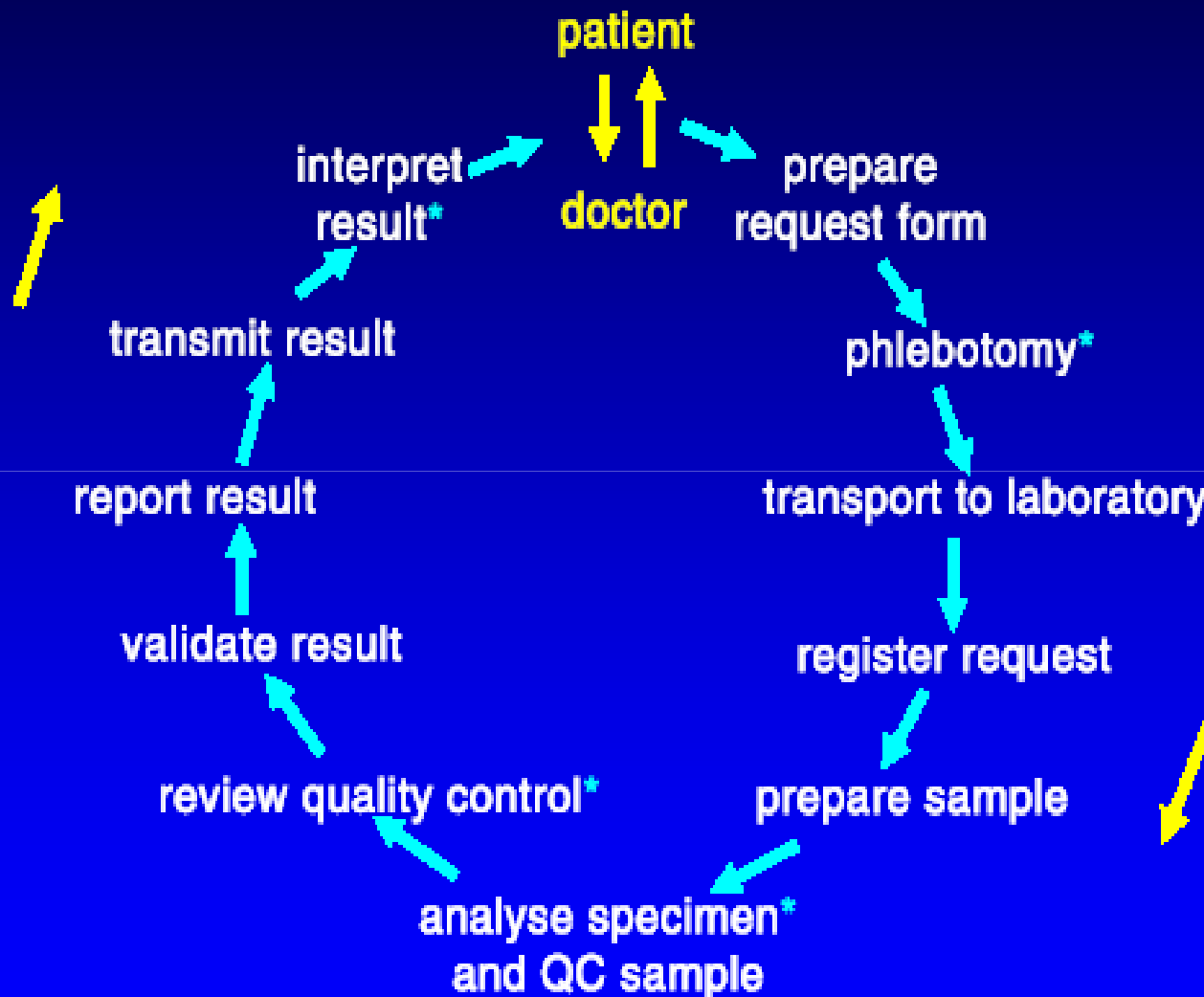
and he said...

“Ten minutes
maximum...
**less if I have to
do some tests!”**”

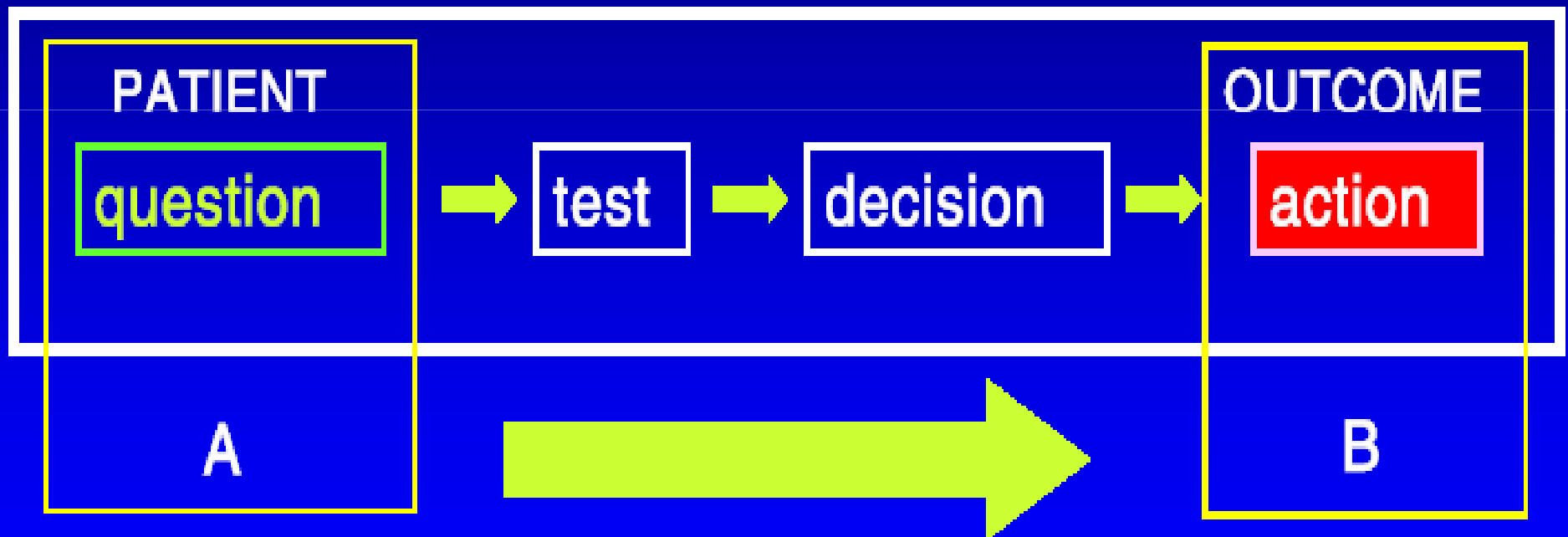
POCT in the ED - Will we adopt it?



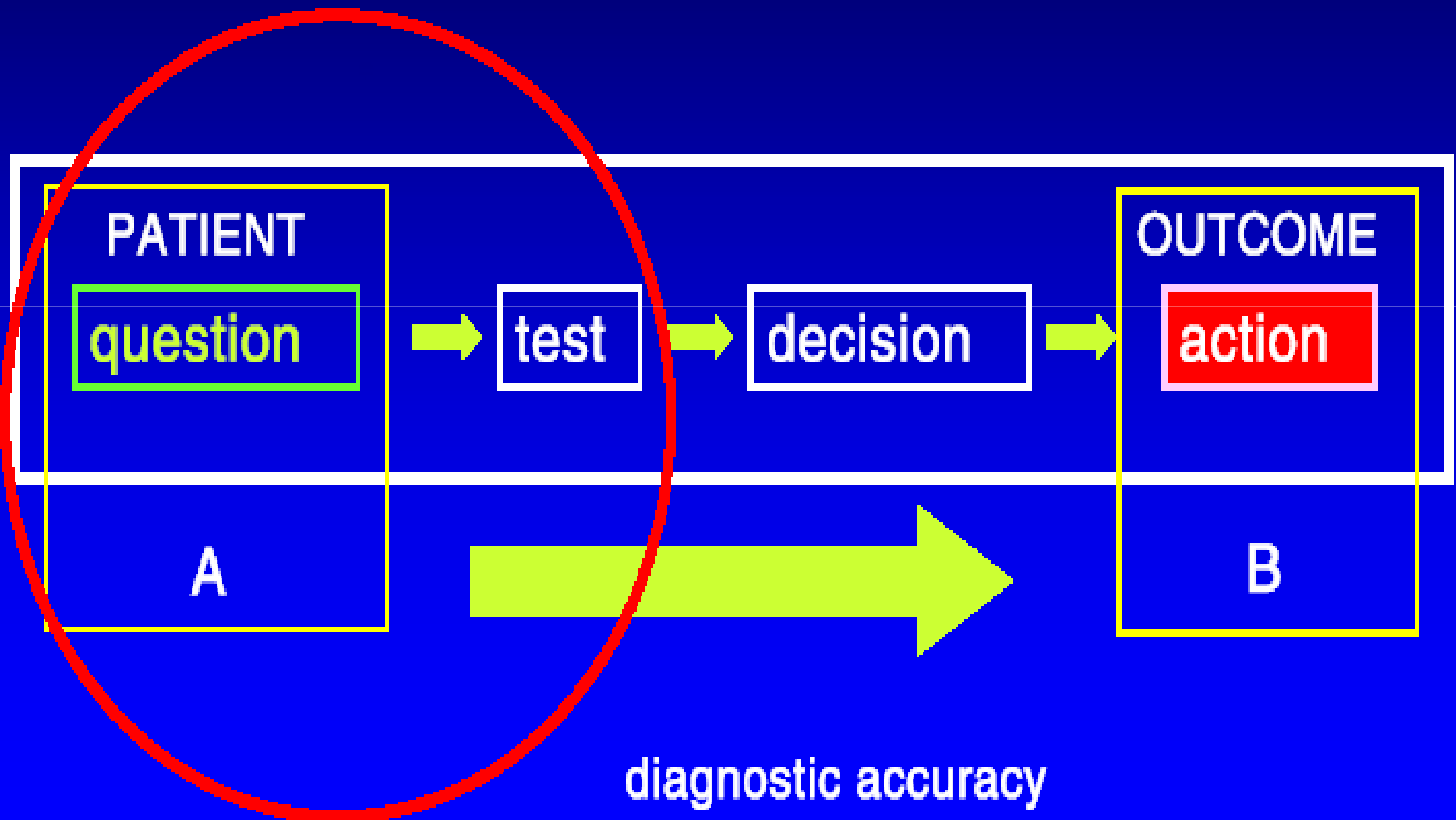
Improving Delivery of Results



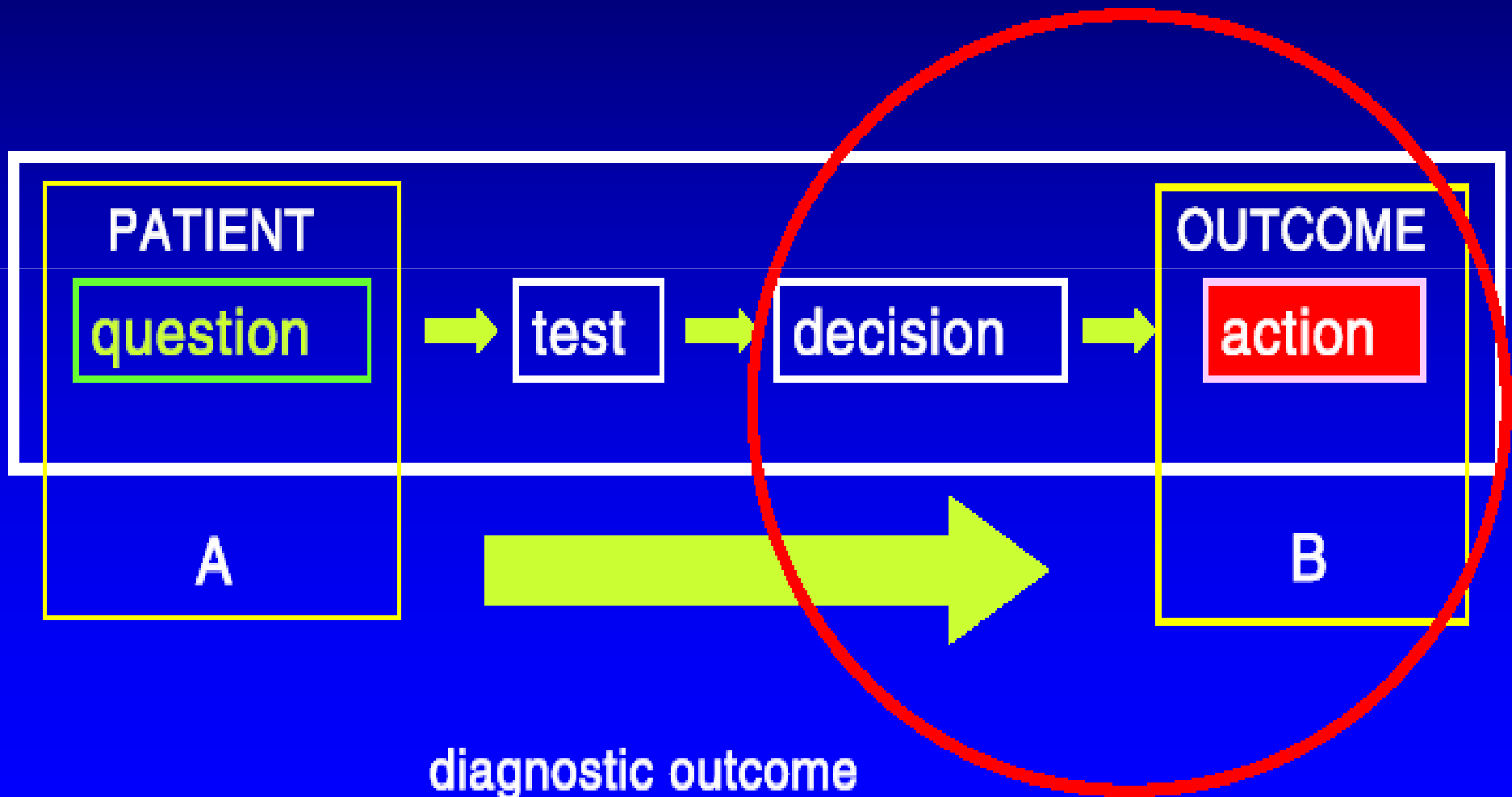
Point of Care Testing an integrated sequence



Point of Care Testing an integrated process



Point of Care Testing an integrated process



Turn around times (TAT)

- **Lab** has one definition of TAT
- **Clinician** define it as Therapeutic turn around time

Clinical Lab -TAT

- Begins when the specimen arrives in the lab
- Ends when the results is reported to the clinical area
- Disadvantage
 - It does not account for all those steps there are encompassed in the ENTIRE specimen/sample procurement, transport and analysis process;

but

Includes those steps that are done only in the lab

- ? **When** the test was ordered
- ? **How** long it takes to implement a patient's treatment *based on the lab result*
- lab turn around time is simply one measure of lab efficiency

Clinicians define TAT as- therapeutic TAT

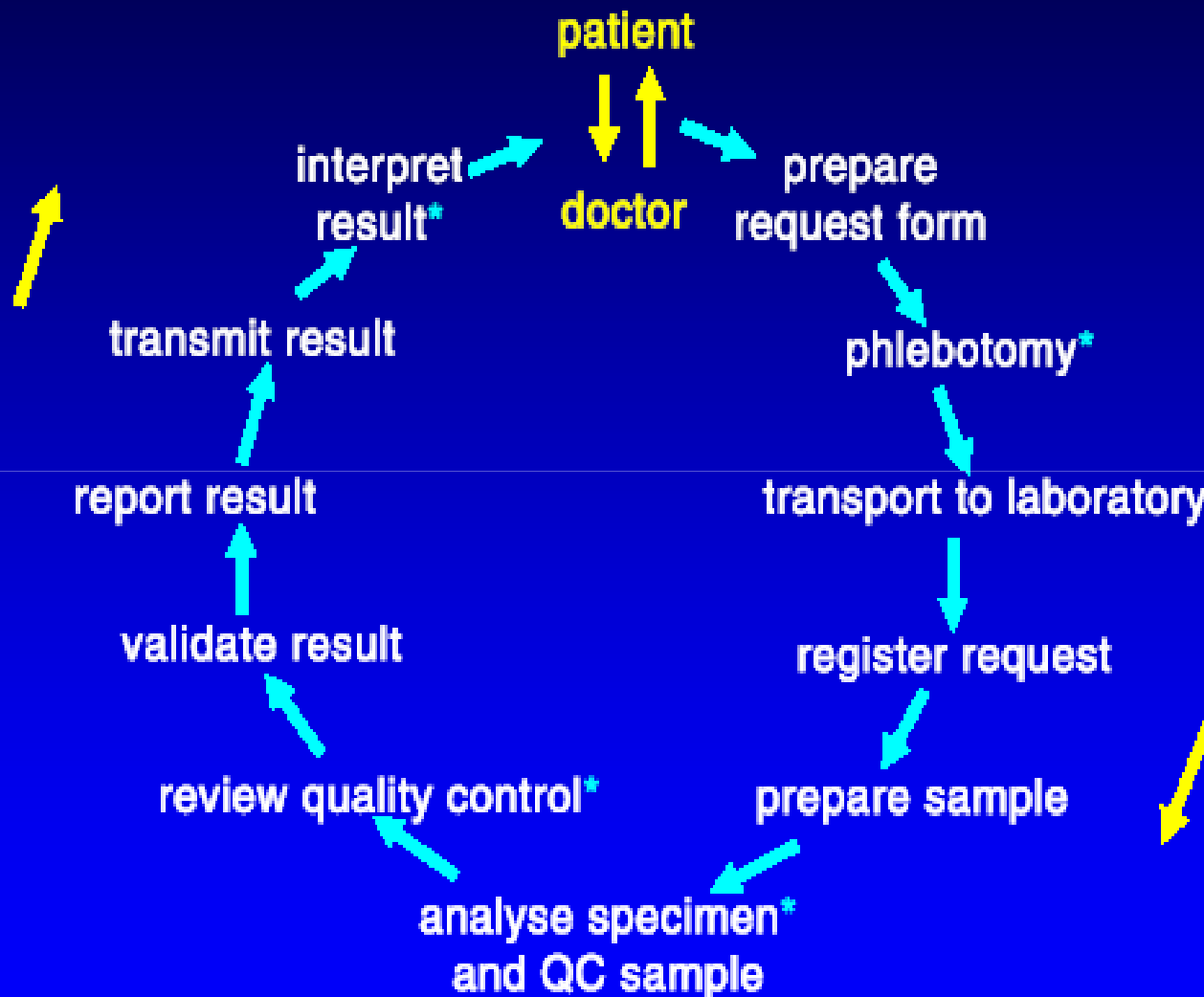
- It is longer than the lab TAT
- It measures the efficiency of the *entire process* – specimen/sample collection, transportation, analysis, report collection, showing it to caregiver and implementation of his/her orders on the basis of lab data report
- Time that it takes to make a treatment decision

?????

ISSUES IN APPLICATION FOR USE
OF POCT IN CRITICALLY ILL
PATIENTS

Comparison of steps required
for STAT blood analysis
process using both a **Central
Laboratory** and **POCT**

Improving Delivery of Results



Review of **Advantages** and challenges of POCT in critical care

Advantages of POCT process

- Improves staff efficiency by
 - Reducing number of steps required to have sample analyzes, thus reducing the total number of interferences in the STAT blood analysis process
 - Nursing can perform patient care tasks while analysis is being performed at the bedside
 - Nurse can manage the critically ill patients and not be pulled away to prepare sample for transport sample/ call for courier/ call laboratory for results

Review of **Advantages** and challenges of POCT in critical care

Advantages of POCT process

- Improves staff efficiency by
 - Eliminates manual transcription of results
 - Faster turnaround time of test results allows the nurse to seamlessly, without interruption care of the patient
 - *Eliminates time spent locating pneumatic tube/ courier/messenger/* obtain ice for blood gas samples

Review of **Advantages** and challenges of POCT in critical care

Advantages of POCT process

- Improves staff efficiency by
 - Test results provided to nurse or **indicative** to patient's *current status aiding* in the accurate *diagnosis* and *treatment*
 - **Integration** of POCT test **results** into patient monitors improves ability to **assess** and monitor *patient's status*

Review of **Advantages** and challenges of POCT in critical care

Advantages of POCT process

- Improves staff efficiency by
 - Availability of electronic **quality control** makes it easy to **ensure accurate** and reliable test results
 - **Automatic/electronic transfer** of POCT test results *improves record keeping and billing*
 - Provides **faster treatment decisions** and assessment of the patient

Review of Advantages and challenges of POCT in critical care

Challenges for POCT process

- The adaptation of POCT process requires willingness and ability of nursing staff to:
 - Understand and identify weaknesses in current STAT blood analysis process
 - Change the traditional way of receiving STAT blood analysis results
 - Learn how to integrate new processes into current patient care flow

Review of Advantages and challenges of POCT in critical care

Challenges for POCT process

- The adaptation of POCT process requires willingness and ability of nursing staff to:
 - *Change ordering patterns*
 - Adapt to a new blood sample processes
 - Devote time required up front to learn about a new piece of equipment
 - Respect and adhere to quality control requirements

Review of **Advantages** and challenges of POCT in critical care

Clinical Laboratory

- Reduces cost of the current STAT blood analysis process **improves efficiency** of laboratory staff by **eliminating disruptive** STAT test requests from their **normal workflow** of routine testing
- Allows clinical laboratory to focus on **developing outreach laboratory services**
- Provides **accurate** and **reliable** test results through the use of electronic **quality control** and automatic calibration

Review of Advantages and challenges of POCT in critical care

Clinical Laboratory overall supervisory role.

- The use of POCT data management applications allow the clinical laboratory to monitor instrument performance, operator compliance, cartridge and test strip performance, quality control compliance, and the integration of data from one location, improving:-
 - Regulatory compliance
 - Operator compliance
 - Cartridge/ reagent utilization

Review of **Advantages** and challenges of POCT in critical care

Clinical Laboratory and supervision of POCT services

- Improves the ability of the laboratory to update its data base all POCT tests performed for **record keeping and billing purposes**
- **Improves turn around time** for STAT test result to critical care areas by enhancing POCT capabilities and **reducing workload for Stat lab**
- **Ensuring quality control** is being performed in critical care areas
- Tracking operator training requirements and compliance

Review of **Advantages** and challenges of POCT in critical care

Clinical Laboratory

- Maintain current software versions for all POCT instruments
- Conducting **training for end-users**
- Coordinating of a POCT program with many different entities within one hospital

Review of **Advantages** and challenges of POCT in critical care

Clinical Laboratory

- Ensuring accuracy and reliability of test results being carried out **at POCT sites**
- Meeting the STAT test menu required in each critical care settings

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Test ordered	Physician/Nurse practitioner (NP)	Verbal order given instead of written

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Order processed	Unit secretary or nurse of respiratory therapist	<ul style="list-style-type: none">•Order written but not given to secretary•Chart sits on desk until secretary has time to process•Unable to process because:<ul style="list-style-type: none">–Computer is down–Need to replace supplies

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Supplies are collected	Nurse/respiratory therapist	<ul style="list-style-type: none">•Time it takes to physically collect all supplies•Replace any missing supplies•Print labels for tubes or syringes

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Sample is drawn	Nurse/respiratory therapist	<ul style="list-style-type: none">•Extra time if blood sample is difficult to obtain•May need to call for phlebotomist

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Sample is prepared for transport	Nurse/respiratory therapist	<ul style="list-style-type: none">•Problem with printing the requisition (printer out of paper, test not entered into computer, large number of items in the print queue, computer is down)•Problems with sample labeling (department missing, labels missing)•Obtain ice for appropriate samples

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Sample is transported	Messenger or pneumatic tube	<ul style="list-style-type: none">•If using pneumatic tube, may need to wait•Pneumatic tube bullet missing, need to wait or call for a bullet•If using messenger must wait for scheduled run or call for additional run and messenger usually collects several STAT specimens before returning to lab•Lost samples or requisitions

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Laboratory receives sample and logs it into their system	Medical technologist	<ul style="list-style-type: none">•Extra time if several STAT samples from different areas arrive simultaneously•Accession employee not at desk

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Sample is run in the laboratory	Medical technologist	<ul style="list-style-type: none">•Benchtops down for maintenance, calibration, or quality control•Won't run if sample is not correctly labeled•Errors in the test requisition•Sample not labeled STAT•No accession number or test request form

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Results are reviewed	Medical technologist	•Many STAT test results must be reviewed, causing delays or longer TAT

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Results are then transmitted back to the patient care area	Medical technologist / laboratory secretary	<ul style="list-style-type: none">• Failure to code test as STAT results in slower transmission• May come by phone, online, or by paper printout

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Wait for test result	Nurse / respiratory therapist	<ul style="list-style-type: none">•Must continually check multiple places where test results may be reported•May telephone the laboratory to check on results•Hospital Information System is down for maintenance or purging of information

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Obtain the results from computer / printer / phone	Nurse / respiratory therapist and/or unit secretary	Paper requisition can be misplaced by another caregiver when pulled off the printer

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Nurse reports the results to physician/ NP	Nurse/physician/ NP/respiratory therapist	Time lag in contacting physician/ NP once results are ready

Steps required for STAT Blood Analysis Process Using a Central Laboratory

Step	Personnel involved	Potential interferences Leading to inefficiencies
Physician/NP adjusts patient treatment as appropriate	physician/NP	May need to take verbal order
Implement the treatment	Nurse/respiratory therapist	-

Therapeutic TAT in minutes

- Collect supplies and prepare sample: 6.2
- Sample transport: 2.9 to lab
- TAT –central lab: 27.3 for ABG's manual method(cal;control;entry result; verification; data transmission
- TAT – electrolytes: 8.2

Two around time for portable system in minutes

- Connect supplies and sample prep: 3.2
- **Sample transport:** 0
- Wait for result: 2
- TAT – ABG's – POCT: 6.8
- TAT–Electrolytes POCT: 7.1
- TAT – Hb and Hct & POCT: 7

Turn around time using Blood Analysis Module

- Collect supplies and prep samples: 1.8 min
- **Sample transport : 0**
- Wait for result: 2
- Turn around time for ABG's: 4.1
- Turn around time for electrolytes: 3.8
- Turn around time for Hb & Hct: 4.2

Conclusion

The *majority of problems* associated with TAT are not found within the laboratory but exist primarily within the critical care unit.

Reduction/elimination of these step shall help to reduce the therapeutic turn around time in critically ill patients thus contributing to better clinical outcome.