Diagnostic Stewardship

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Diagnostic Stewardship

It should promote

- Ordering the right test
- Collecting the right specimen
- Performing the tests by the right method
- Reporting the right interpretation of the test results
- Communicating the report at the right time

Clinical components

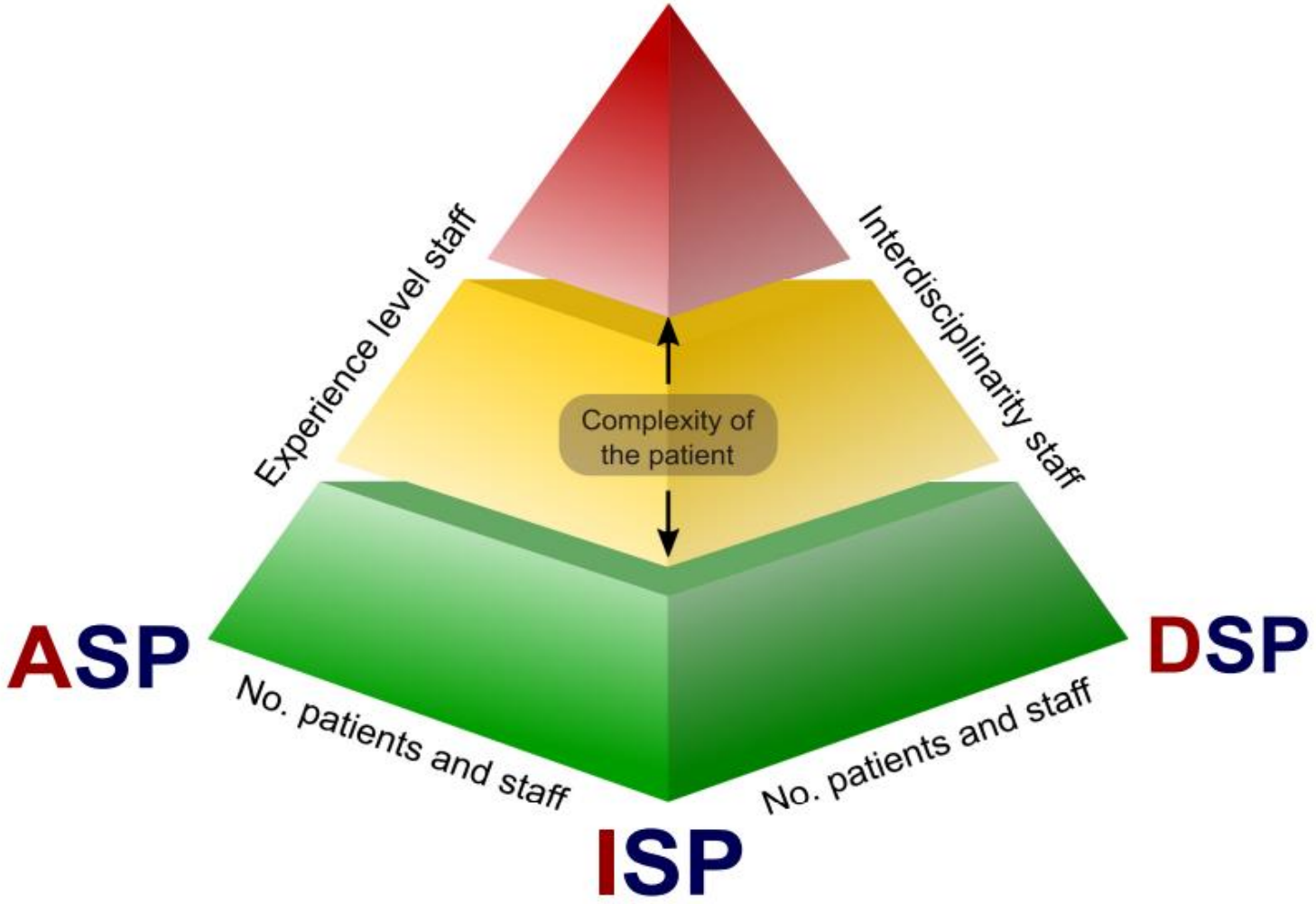
- Ordering the right test (indication)

Collecting the right specimen Microbiology components

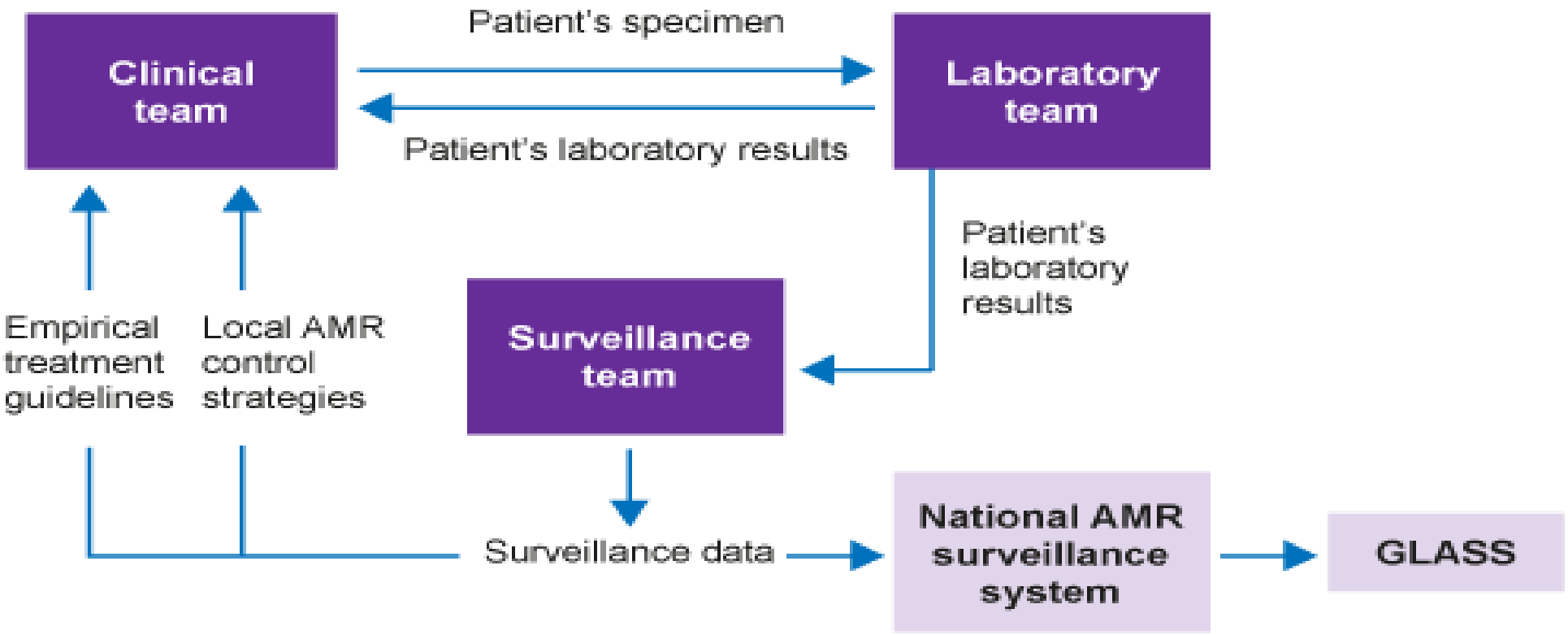
- Performing the tests by the right method (accurately and reliably)
- Reporting the right interpretation of the test results
- Communicating the report at the right time

Linking Diagnostics to Stewardship: The right Test for the Right Patient at the Right Time

- **Is the test appropriate for the clinical setting?**
- **Will the clinical care of the patient be affected by the test result?**
- **Will the result be available in time to optimally affect acre?**

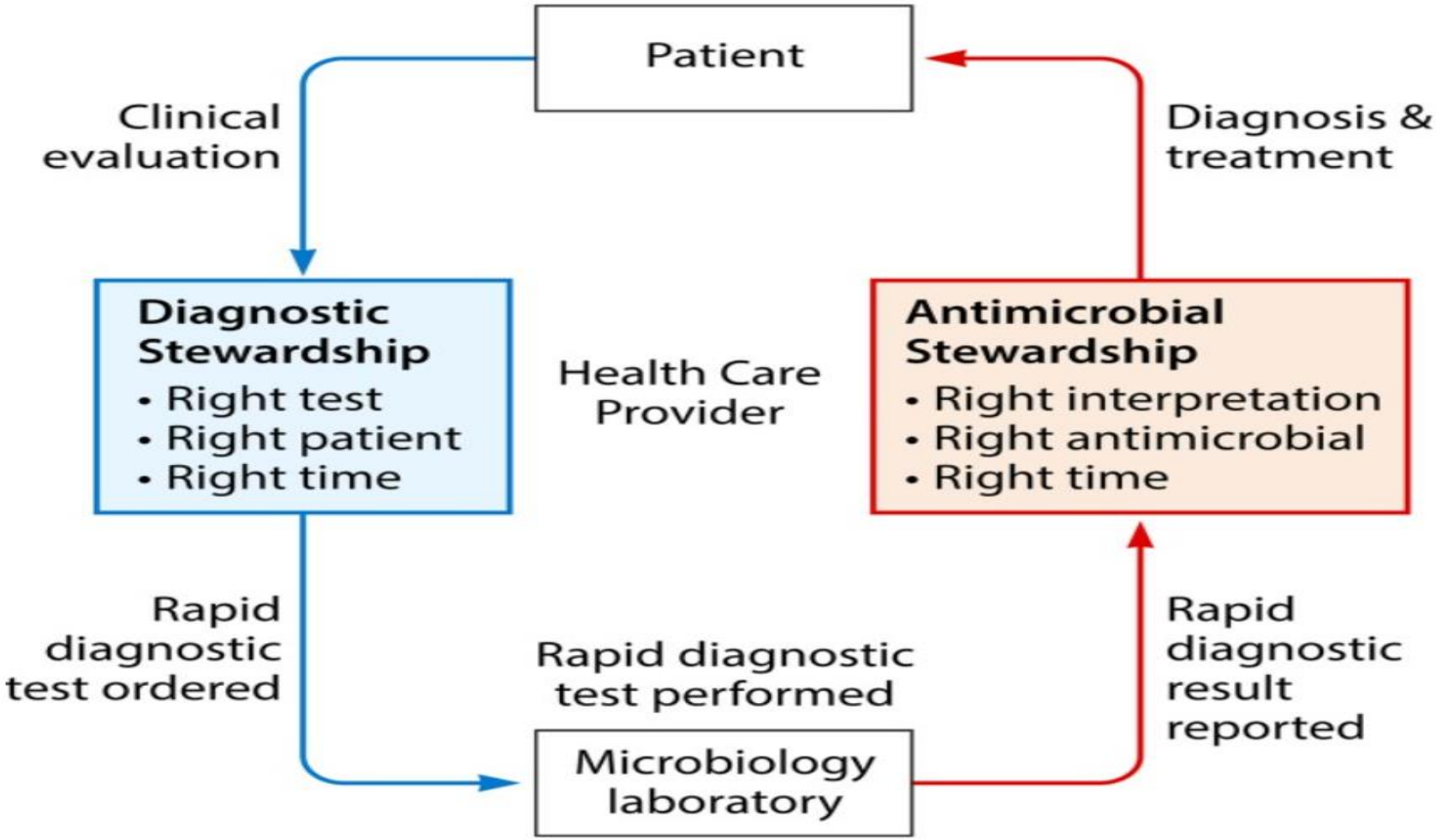


Diagnostic Stewardship



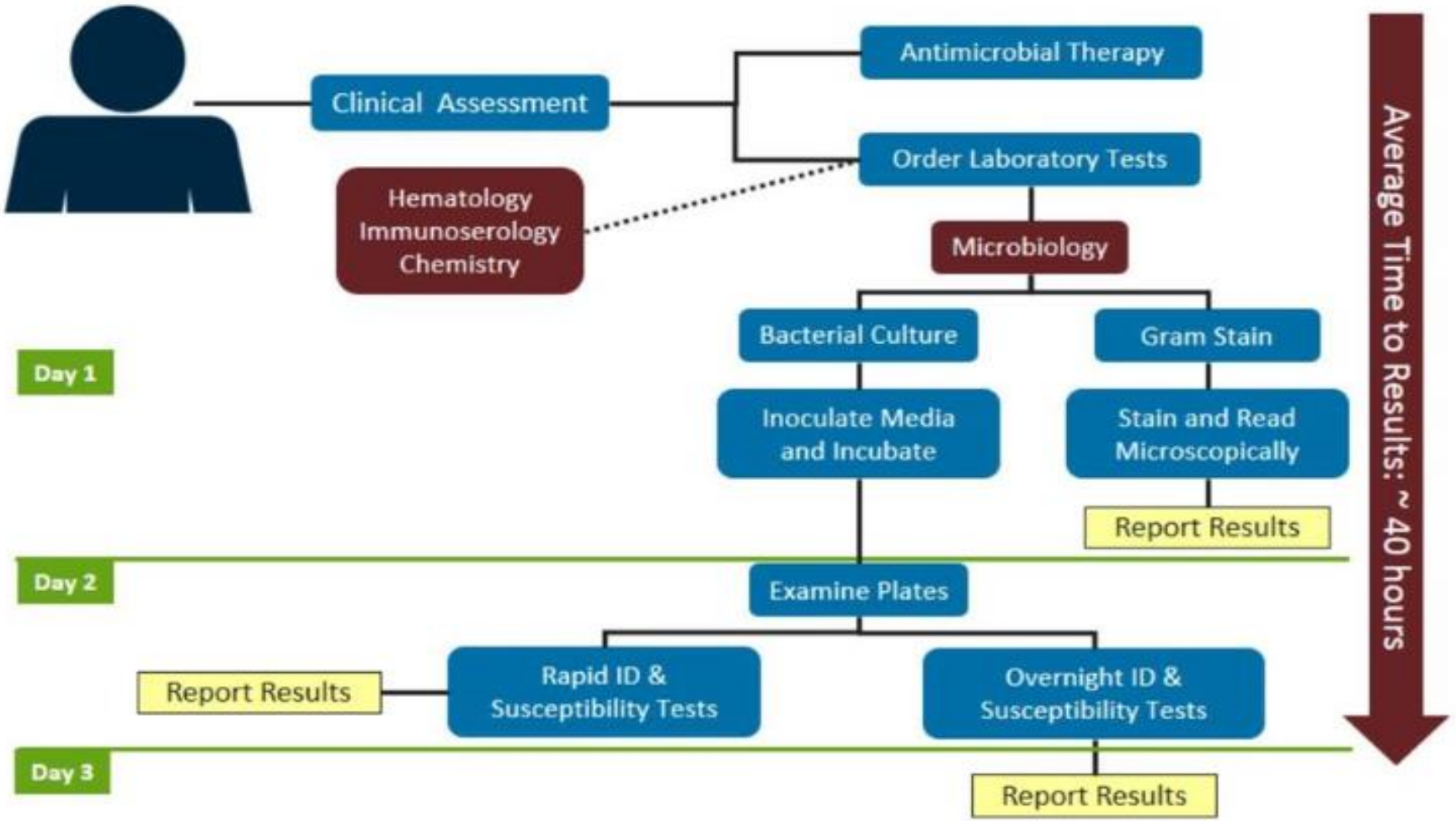
Pulcini C et al, 2017
https://doi.org/10.1016/j.cmi.2017.07.013

Diagnostic and Antimicrobial Stewardship



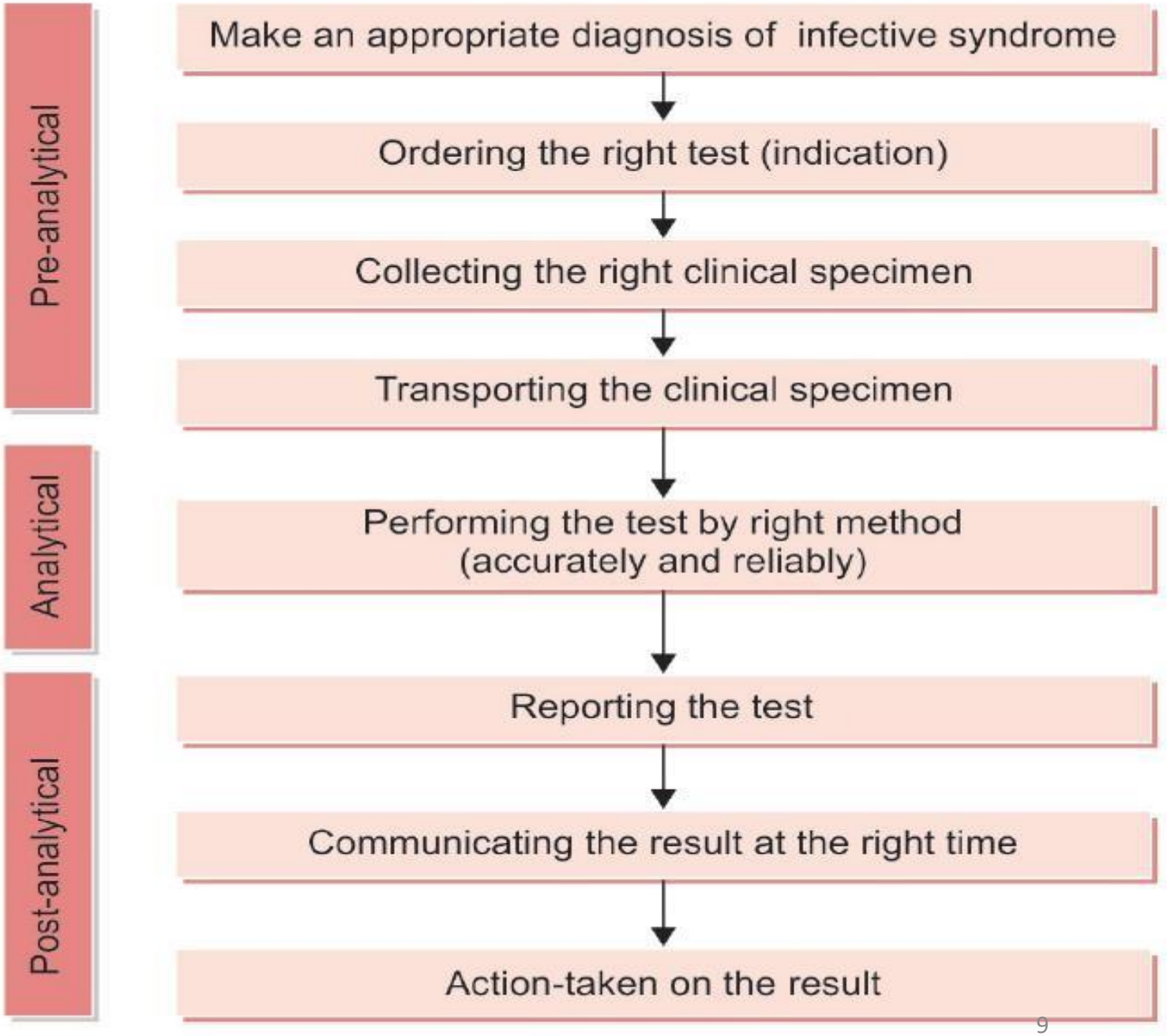
Role of Microbiology Laboratory

Path of Conventional Microbiology



Goff D, et al. *Pharmacotherapy.* 2012;32:677-687.

Diagnostic pathway



Sastry A, et al. (2022) Essentials of Antimicrobial Stewardship (1st Ed.) Jaypee

Diagnostic Stewardship

Infrastructure Support

Microbiology laboratory should provide **automated methods** that dramatically reduce the ‘’turn around’’ time –

a) Bactec or Bact-T/ Alert
b) Vitek MIC method.
c) Biomarkers: Procalcitonin and CRP
d) Rapid molecular test.
e) Emergency lab

Ordering the right test and interpret diagnostic tests

- Right patient
- Right test
- Right time

Collecting the Right Specimen

- Type of specimen collected
- Method of collection
- Volume of the collected specimen
- Time of collection
- Specimen labeliing
- Transport time
- Storage conditions to be maintained

BLOOD CULTURE REQUISITION FORM (BACTEC/BACTEALERT)

Name: Age: Sex: Hospital No:

Department: **Unit:** **Date and time:**

Blood culture sent: a) Before antibiotic start b) After antibiotic start

Antibiotic going on or going to be started: (EMPERICAL/DEFINITIVE/PROPHYLATIC)

1._____ 2._____

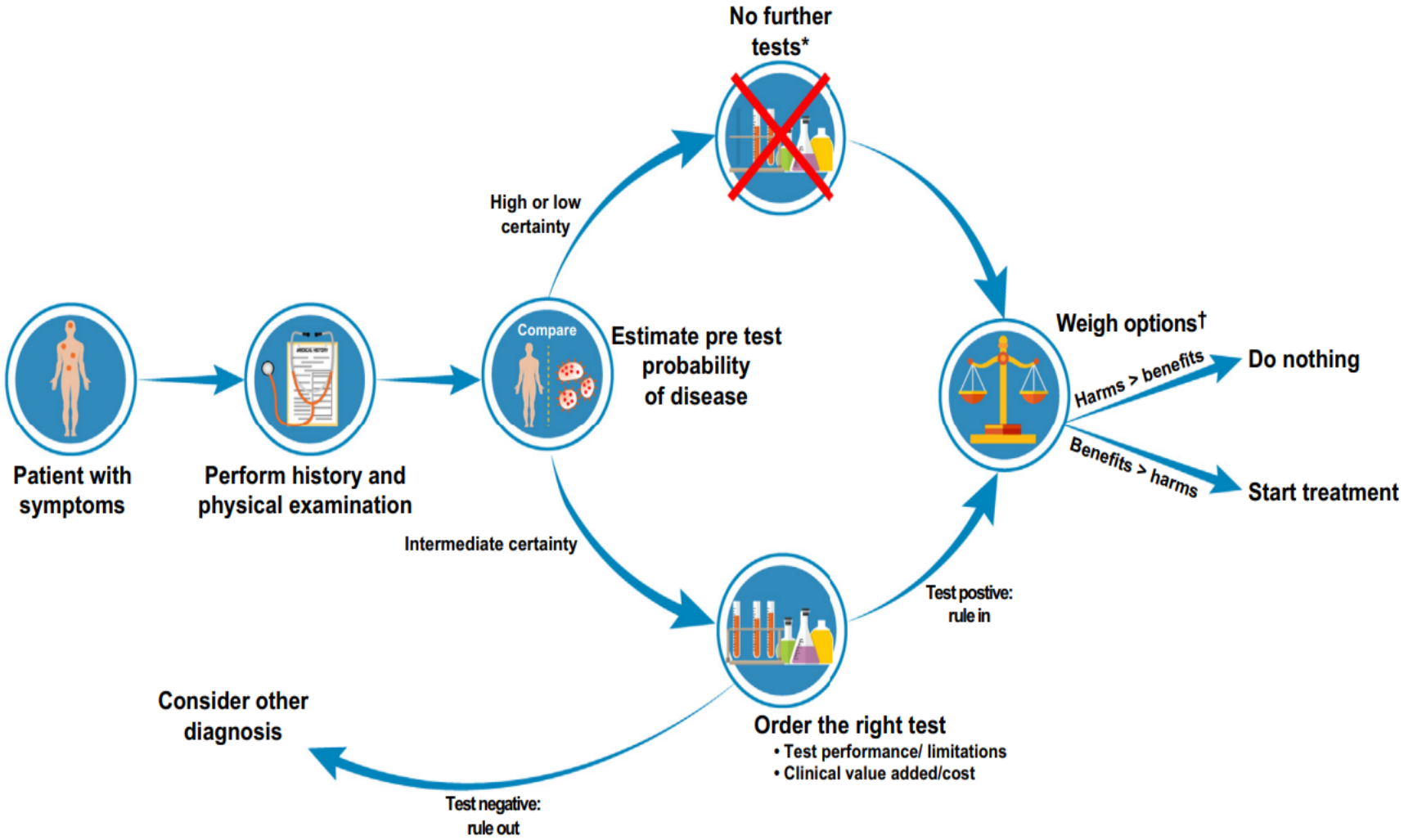
3_____ 4._____

PROVISIONAL DIAGNOSIS:_____

CHECK LIST (TO BE FILLED BY PHLEBOTOMIST*)	1st bottle	2nd bottle
Site: CL / PL/V (Central line /Peripheral line/Venepuncture)		
1. Performed hand hygiene		
2. Used sterile gloves		
3. Apply tourniquet, palpate the vein and mark the area		
4. Used 70% alcohol and rub the skin vigorously (5cm circle)		
5. Waited for 30 sec (allow the skin to dry)		
6. Used Chlorhexidine /povidone I_2 to disinfect site concentric inside out		
7. Waited for 2 min (allow the skin to dry)		
8. Did not palpate skin again after disinfection		
9. Used alcohol wipe is to clean the bottle top		
10. Used the same needle for blood collection and injecting to bactec bottle		
11. Volume collected(Ideal: 8-10ml for adult, 1-3ml for paed/sterile fluid)		

Courtesy: Dr Apurba Sastry

Choose and Interpret Diagnostic Tests Wisely



- Test performance
- Diagnostic utility
- Testing volumes
- Lab feasibility
- Cost effectiveness
- Clinical impact

Clinical Microbiology Decision Support Systems

Automation in culture

BACTEC MGIT 960

Data from LIS, instrument integrity along with artifical intelligence from guidleines like CLSI

Automation in Identification

MALDI-TOF

VITEK

PHOENICS

MICROSCAN

Automation in AST

VITEK

Also

BD Pheonics
MicroScan

Extended AST

- If needed Broth microdilution for colistin and agar dilution for fosfomycin
- Methodologies to reconfirm the aberrant results of AST

Xpert Carba R

Biofire film array

Direct susceptibility testing- for preliminary report

Molecular RDTs: Culture Dependent

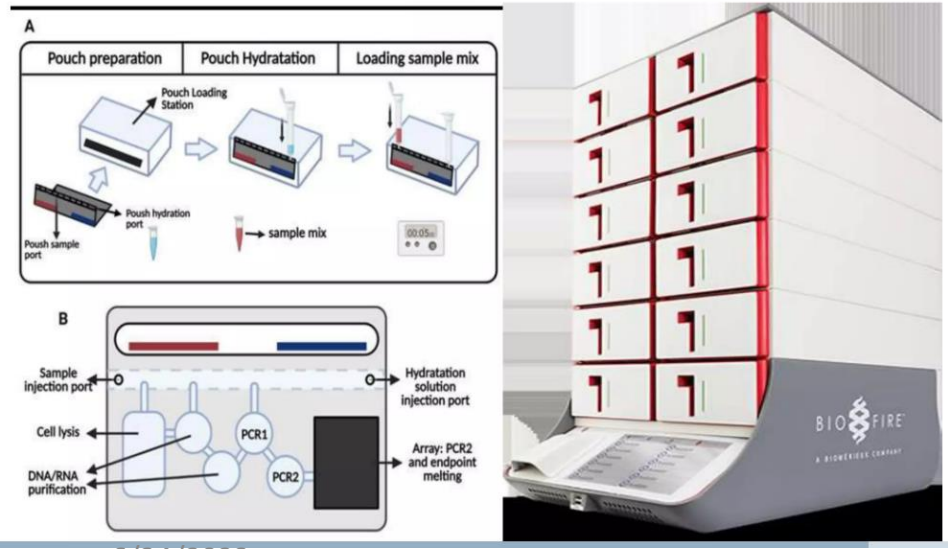
- Rapid biochemical identification[a]
- Proteomic identification (MALDI-TOF MS)[a]
- Rapid identification of pathogens in blood cultures[a]
  - BCID microarrays
  - PNA-FISH
- Rapid phenotypic AST[b]
- NAAT detection of selected resistance genes[a]
  - *mecA*
  - *vanA/vanB*
  - KCP

a. Bauer K, et al. *Clin Infect Dis*. 2014;59:S134-S145.
b. Avesar J, et al. *Proc Natl Acad Sci U S A*. 2017;114:E5787-E5795.

Syndromic testing

- Symptom driven " broad grouping of probable pathogens into one" rapid test that maximizes the chance of getting the right answer in a clinically relevant timeframe.

Biofire Film Array



Biofire Film Array for Respiratory pathogens
Respiratory 2.1 Panel
1 Test / 21 Targets / ~45 Minutes

With Automation

- **Mean identification time** after culture positivity reduced
  - From **32 hours** (±16 hours) to **6.5 hours** (±5.4 hours)
- **Mean time to susceptibility results** reduced
  - From **48 hours** (±22 hours) to **23 hours** (±14 hours)
- **Time to therapy adjustments** reduced
  - From **75 hours** (±59 hours) to **30 hours** (±30 hours)
- **Mean hospital costs per patient** reduced by **30%**

Chirstensen et cl, 2022. Open Forum Infectious Diseases

Direct Microscopic Testing

Stained smears

- Gram stain
- Ziehl-Nelsen stain
- Auramine –rhodamine staining
- Albert staining for *C diphtheriae*
- PAS for fungus
- GMS stain for fungus
- Leishman, Giemsa, Field's stain etc

Mount preparation

- Direct wet mount
- Saline wet preparation
- Iodine wet mount
- KOH mount
- Indian ink mount preparation
- Hanging drop preparation

Utility of Direct Microscopic Testing

- Specimen quality- accept or reject the sample
- Preliminary diagnosis
- Guide impirical therapy
- Further processing of culture workups
- Culture report always be interpreted based on the DST

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Common critical alerts at DST level

Direct Gram stain findings of positively flagged BC bottles
Positive Gram stain findings from CSF and other sterile fluids
Capsulated budding yeast cell seen on India Ink preparation
Gram stain of large boxcar shaped Gram-positive rods in a tissue- suggestive of gas gangrene
Positive Albert staining
Peripheral blood smear positive for malaria parasite
Broad aseptate hyphae seen in KOH mount of tissues
Positive Gram stain finding in intraocular specimens of suspected endopthalmitis cases

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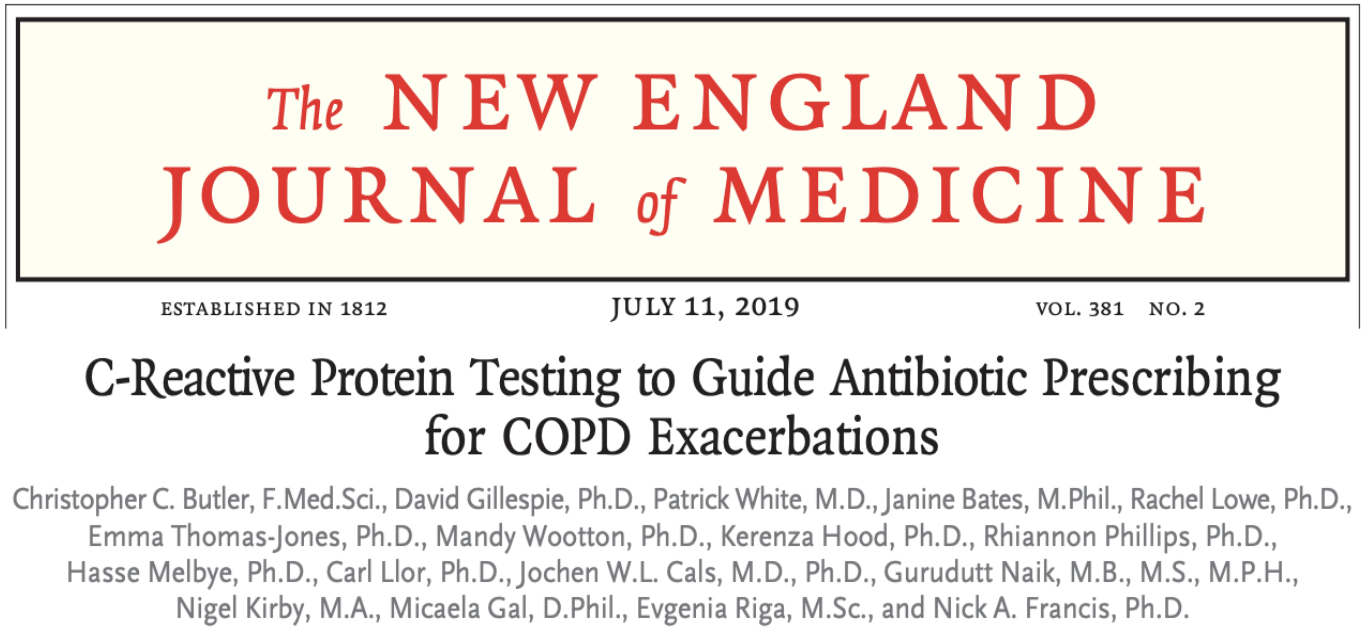
What About the Mismatch Between Direct Microscopy and Culture Findings?

- Direct microscopy negative but culture positive
- Direct microscopy positive but culture negative

Non-Culture / Molecular Methods for Faster Detection



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JULY 11, 2019 VOL. 381 NO. 2

C-Reactive Protein Testing to Guide Antibiotic Prescribing for COPD Exacerbations

Christopher C. Butler, F.Med.Sci., David Gillespie, Ph.D., Patrick White, M.D., Janine Bates, M.Phil., Rachel Lowe, Ph.D., Emma Thomas-Jones, Ph.D., Mandy Wootton, Ph.D., Kerenza Hood, Ph.D., Rhiannon Phillips, Ph.D., Hasse Melbye, Ph.D., Carl Llor, Ph.D., Jochen W.L. Cals, M.D., Ph.D., Gurudutt Naik, M.B., M.S., M.P.H., Nigel Kirby, M.A., Micaela Gal, D.Phil., Evgenia Riga, M.Sc., and Nick A. Francis, Ph.D.

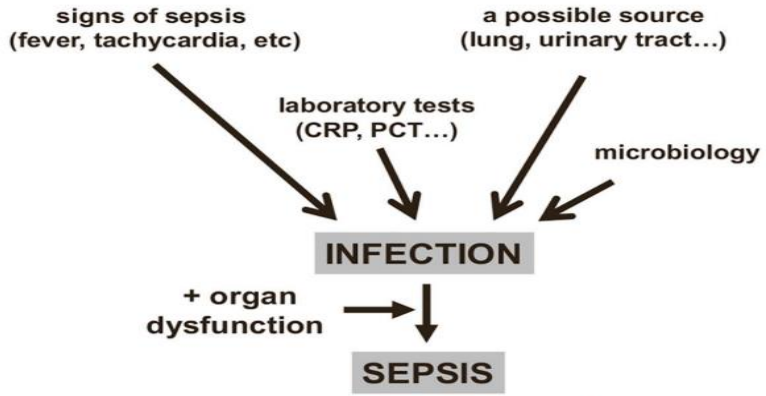
Biomarkers of infection /inflammation

- WBC count
- ESR
- CRP
- Lactate
- PCT
- IL-6
- Host gene expression panels

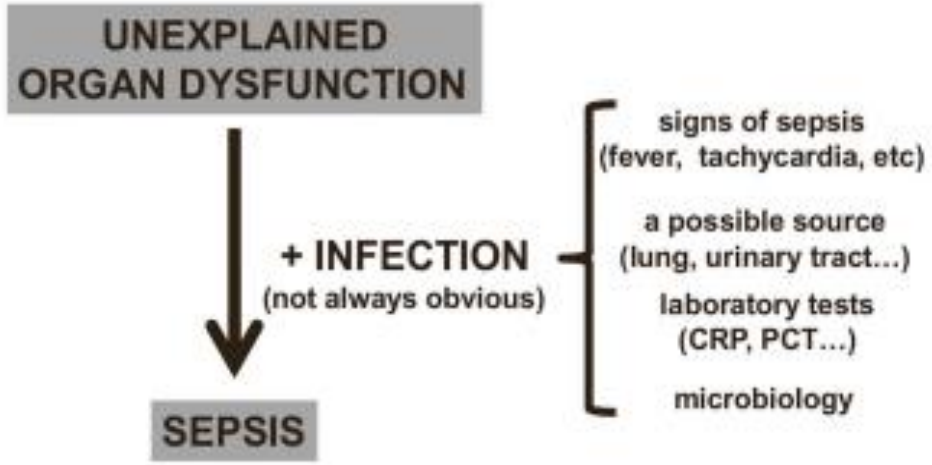
Biomarkers in Sepsis

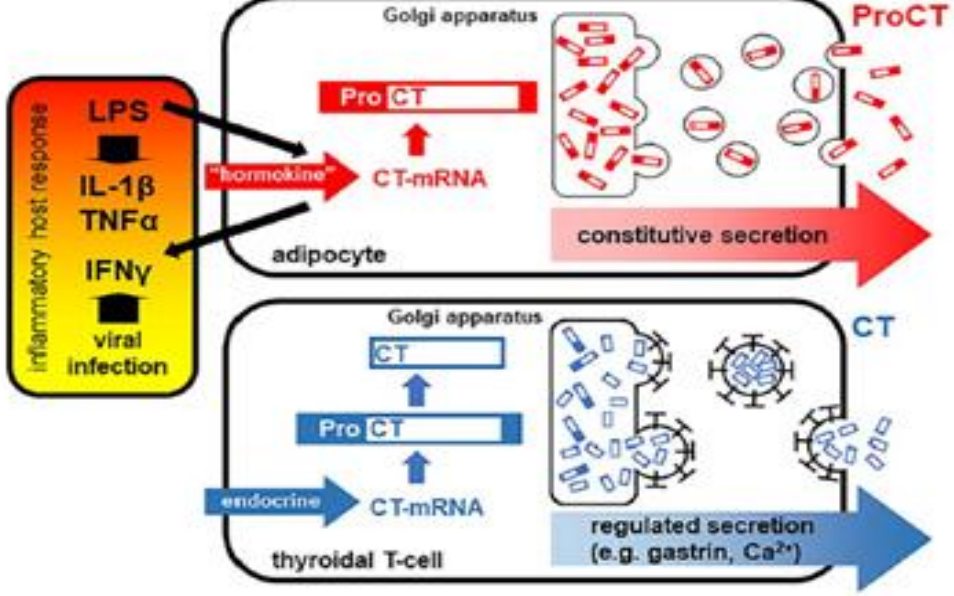
The Challenges

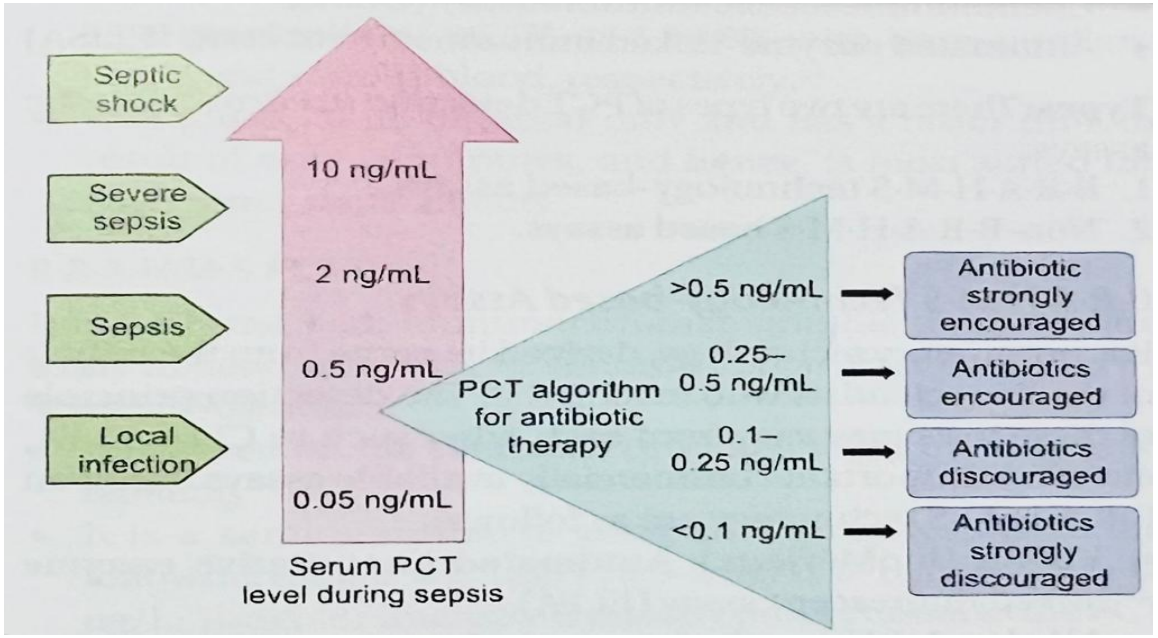
- Diagnosing Infection / Sepsis in critically ill
- Choice of Antibiotics



PLOS Medicine | DOI:10.1371/journal.pmed.1002022 May 17, 2016







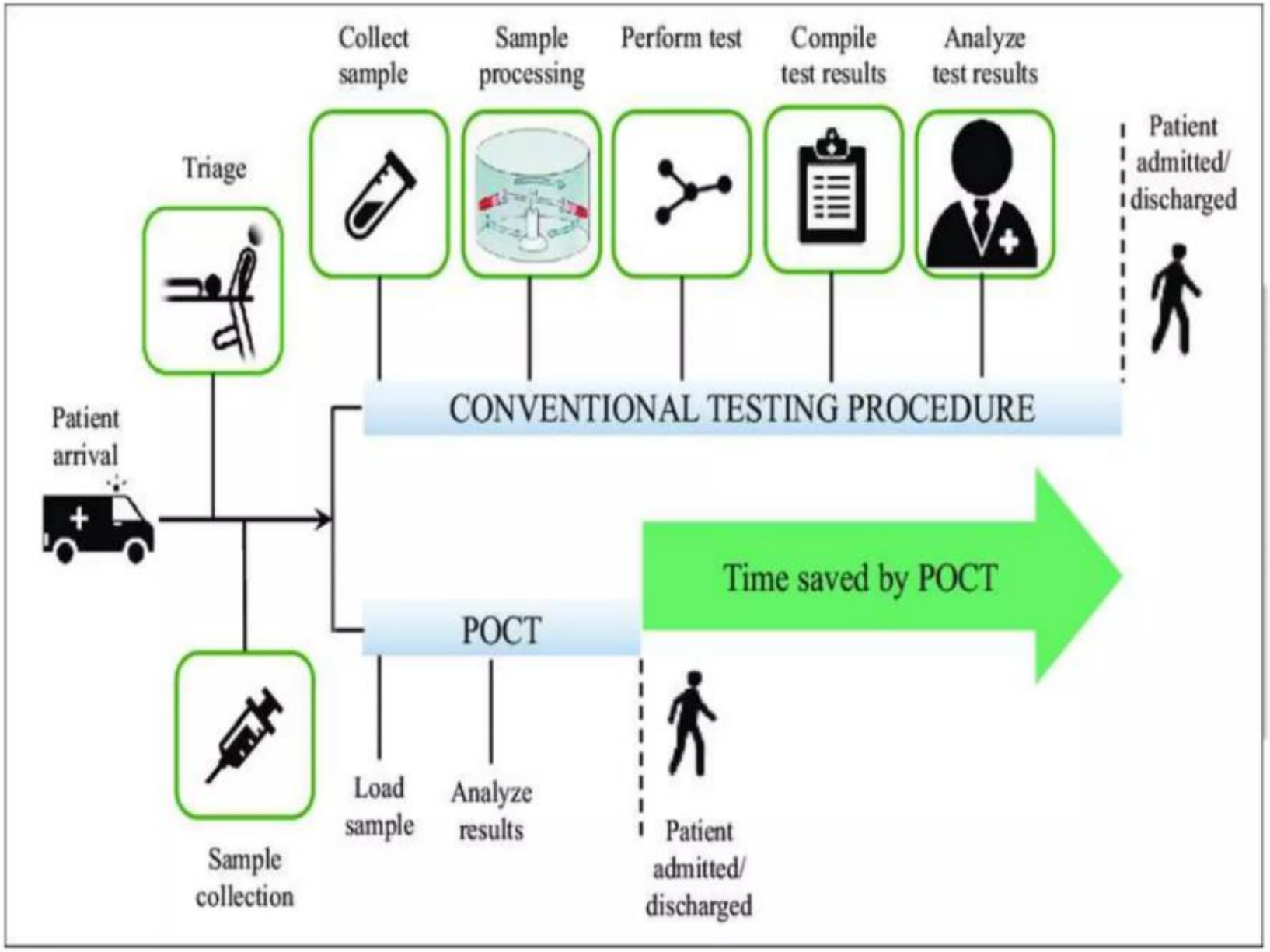
Procalcitonin guided antibiotic therapy in sepsis

Fungal biomarkers

- Galactomannan
- (1-3) –β-D-Glucan
- Candida mannan

B-D glucan	Pan-fungal biomarker	
BDG Positive	Candida, Aspergillus, PCP	False pos.: b-lactam anibiotics haemodialysis, blood transfusion, surgical gauze, albumin or immunoglobulin infusion. Nutritional feeds, environmental contamination during processing
BDG Negative	**Cryptococcus, Mucor**	

Rapid point of care Test



ICT
Pneumococcal antigen detection
GAS antigen detection
GBS antigen detection
C. difficile toxin detection
COVID antigen detection
Cryptococcal antigen detection
Malaria RDT
HIV, HBV, HCV ICT
LAM lateral flow assay

Latex Agglutination
Bacterial meningitis panel

Molecular POCT
GeneXpert- TB, SARS-CoV-2
Truenat-TB, SARS-CoV-2

Commercial Antigen based POCT

Diagnostics-Guided Antibiotic Treatment

	Total (n=577)	Viral infection (n=435)	Bacterial infection (n=71)	Inconclusive (n=71)	p value*
Mean age, months	21 (16)	20 (16)	24 (17)	25 (17)	0·044
Male sex	324 (56%)	246 (57%)	36 (51%)	42 (59%)	0·370
Mean maximal temperature, °C	39·4 (0·8)	39·3 (0·8)	39·7 (0·8)	39·4 (0·9)	<0·0001
Mean duration of symptoms, days†	2·8 (1·7)	2·7 (1·7)	3·0 (1·8)	2·7 (1·8)	0·277
Hospital admission	316 (55%)	219 (50%)	59 (83%)	38 (54%)	<0·0001
Median time in hospital, days	3 (2–4)	3 (2–4)	4 (3–5)	3 (3–5)	<0·0001
Antibiotic treatment prescribed	224 (39%)	100 (23%)	71 (100%)	53 (75%)	<0·0001

- Rapid biomarker assays may differentiate bacterial and viral infections
- This platform measures TRAIL, IP-10 and CRP
- Negative predictive value for bacterial infections in children aged 2-60 mos. was 97.8%

REF: Van Houten et al., Lancet Infect Dis, 2017.

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Ensuring the Right Method

- SOP available according to guidelines
- Adequate training of the staff at regular intervals
- Necessary resources and infrastructure to perform the tests available effectively 24 x 7 functional Lab
- Rigorous Quality control to ensure accuracy and reliability of reports generated

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Right interpretation of test results

Direct microscopy: Gram staining interpreted according to standard guidelines.

I. Presence of organisms with the type of Gram stain morphology
II. Inflammatory cells such as pus cells
III. Sample is appropriately collected

Culture : colony morphology, quantitative culture when required

Identification: Upto species level, correlated with clinical findings and DST findings

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Sample Test Request Form

Patient Identification

a. Unique identification number _____

b. Name: (family name, given name(s)) _____

_____

Gender:

Male ❒

Female ❒

Date of birth: (yyyy/mm/dd) _____

Years _____ Months (if < 1 year) _____

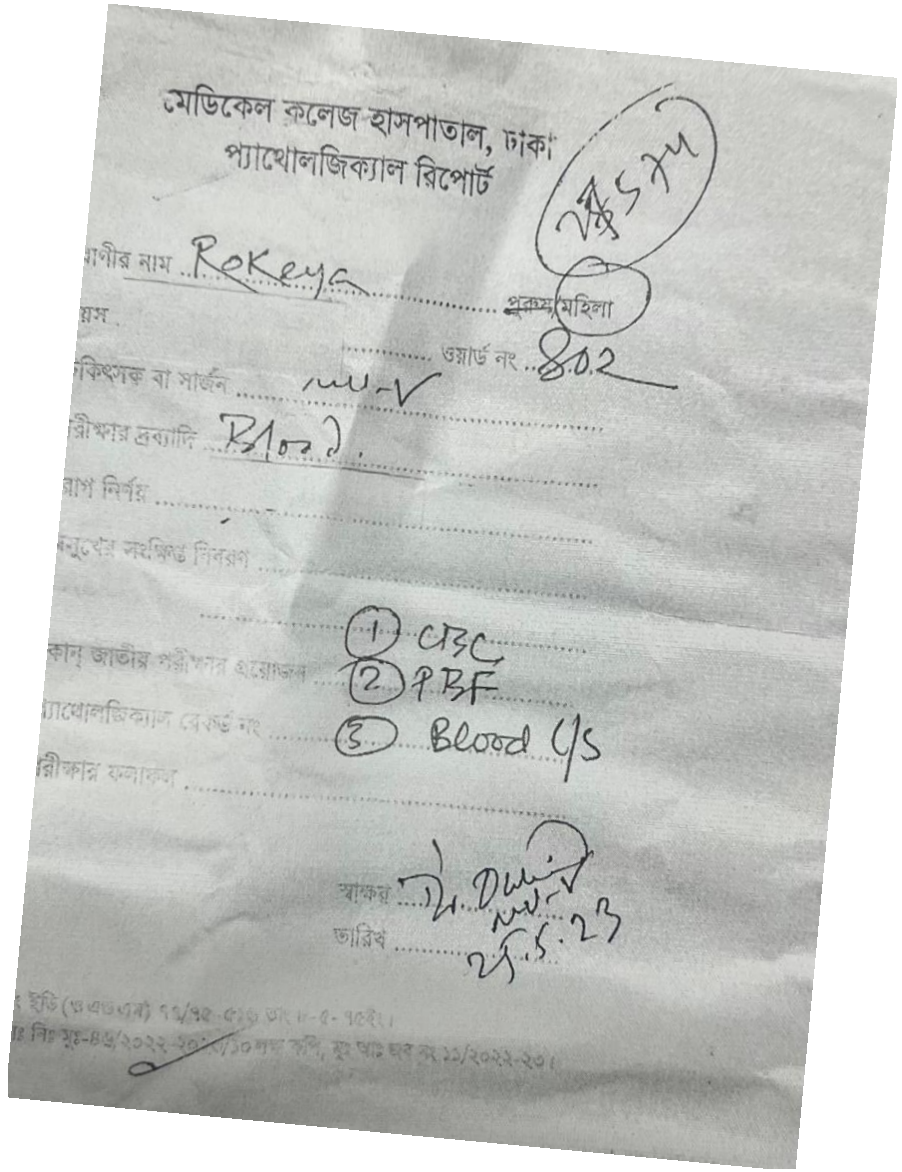
Specimen information:

❒ Blood ❒ Urine ❒ Faeces ❒ Urethral secretion ❒ Cervical secretion

❒ Other

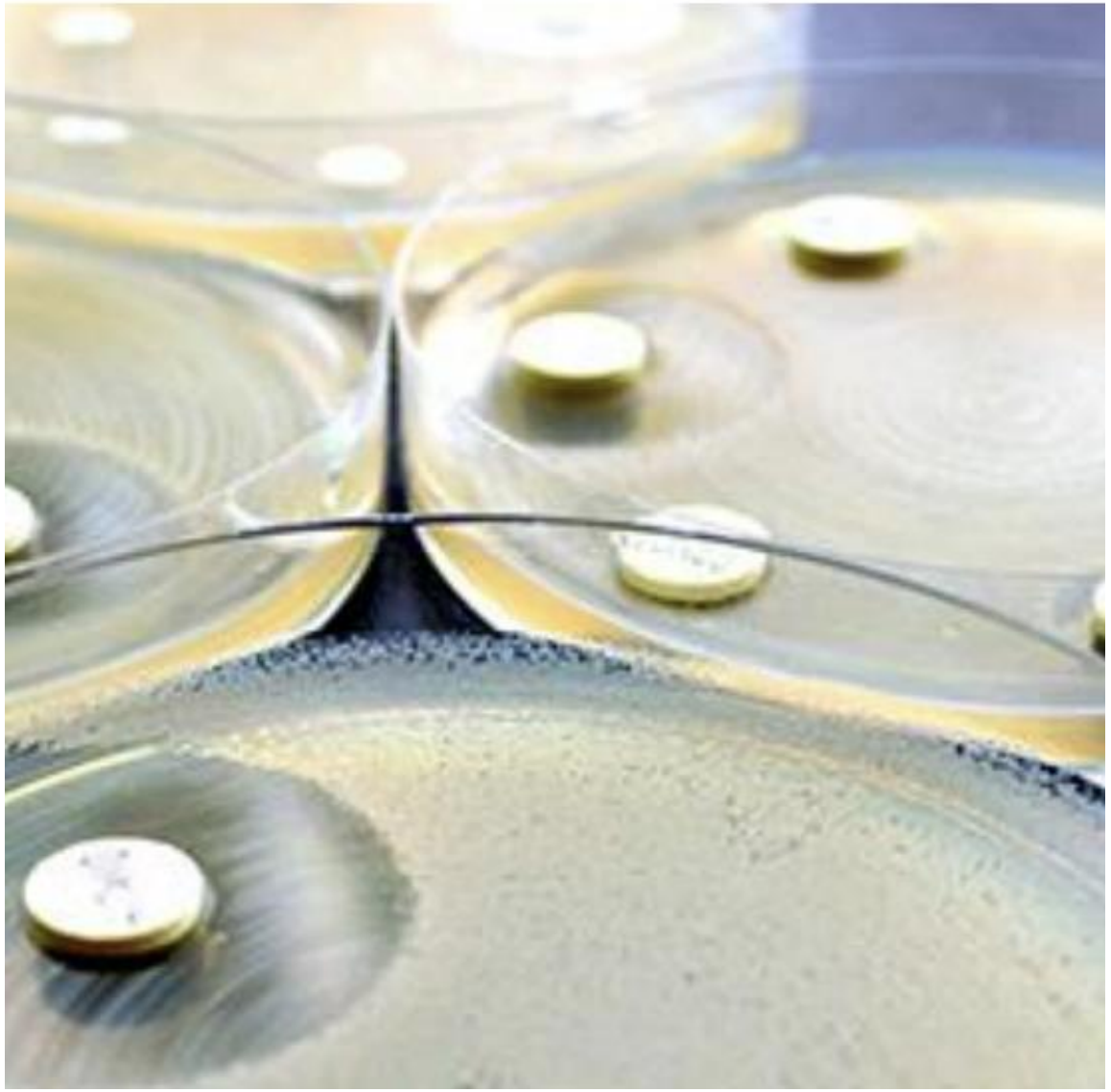
Date of specimen collection: (yyyy/mm/dd) _____	Had the patient been hospitalized for more than 2 calendar days at the time for sampling? ❒ Yes ❒ No	

Source: https://apps.who.int/iris/bitstream/handle/10665/251553/WHO-DGO-AMR-2016.3-eng.pdf?sequence=1&isAllowed=y



INTRINSIC RESISTANCE

ORGANISMS	NATURAL RESISTANCE TO
P. aeruginosa	Ampicillin, amoxycillin, co-amoxiclav, first-generation cephalosporins, second-generation cephalosporins, cefotaxime, ceftriaxone, nalidixic acid, trimethoprim
B. cepacia	Ampicillin, amoxycillin, first-generation cephalosporins, colistin, aminoglycosides
Stenotrophomonas maltophilia	All *β*-lactams except ticarcillin/clavulanate
Salmonella spp.	Cefuroxime, aminoglycosides (active *in vitro*, not active *in vivo*)
Klebsiella spp., *Citrobacter diversus*	Ampicillin, amoxycillin, carbenicillin, ticarcillin
Proteus vulgaris	Ampicillin, amoxycillin, cefuroxime, colistin, nitrofurantoin
Serratia spp.	Ampicillin, amoxycillin, co-amoxiclav, first-generation cephalosporins, cefuroxime, colistin
H. influenzae	Penicillin G, erythromycin, clindamycin
Streptococci	Fusidic acid, aminoglycosides (except as synergists)*
S. pneumoniae	Trimethoprim, aminoglycosides
Methiciilin-resistant *S.aureus*	All *β*-lactams
Enterococci	Penicillin G, carbenicillin, ticarcillin, all cephalosporins, aminoglycosides*, mupirocin
Listeria	Third-generation cephalosporins, fluoroquinolones



Selective reporting

Reporting results for specific antimirobial agents while suppressing few others based on

- Organism identified
- Mechanism of resistance
- Body site
- Clinical setting
- Patient demographics
- Aberrant results

Selective reporting

Antimicrobial Stewardship in the Microbiology Laboratory: Impact of Selective Susceptibility Reporting on Ciprofloxacin Utilization and Susceptibility of Gram-Negative Isolates to Ciprofloxacin in a Hospital Setting

Intervention: Laboratory suppressed ciprofloxacin susceptibility to Enterobacteriaceae when there was susceptibility to other antibiotics on the Gram-negative panel

Outcome	Pre-intervention (2008-2010)	Intervention (2011-2015)
Ciprofloxacin utilization (DDD/1000 patient days)	87 (95% CI, 83.7 to 91.2)	39 (95% CI, 35 to 44)

Increase in use of amoxicillin-clavulanate was noted at 6 months and was sustained
E. coli susceptibility to ciprofloxacin improved significantly 12 months later ($p < 0.05$)

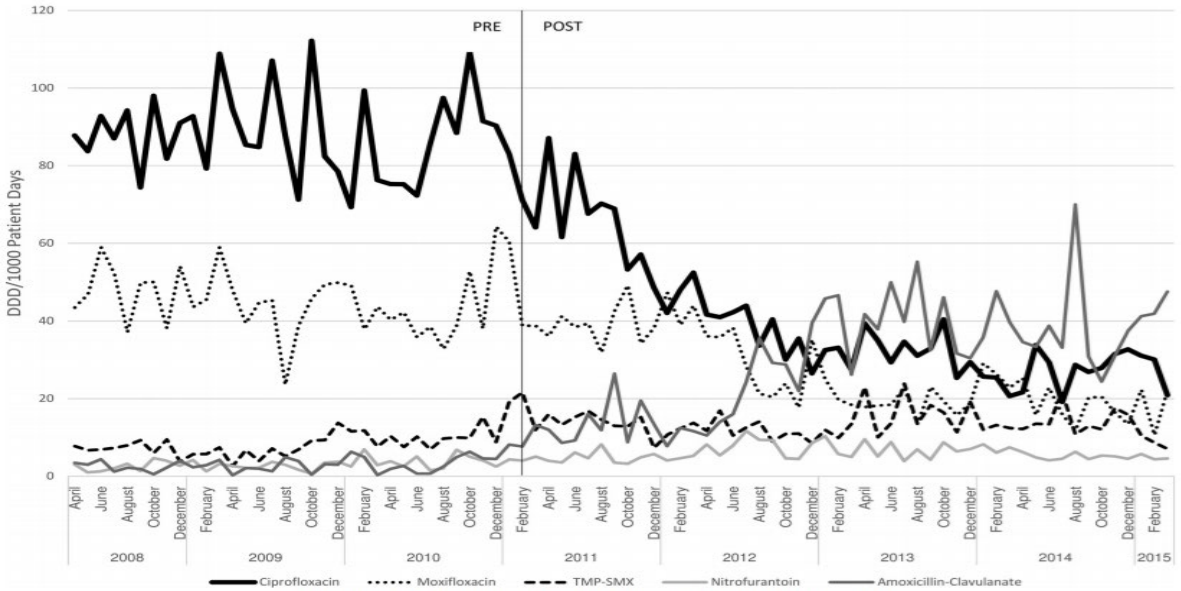
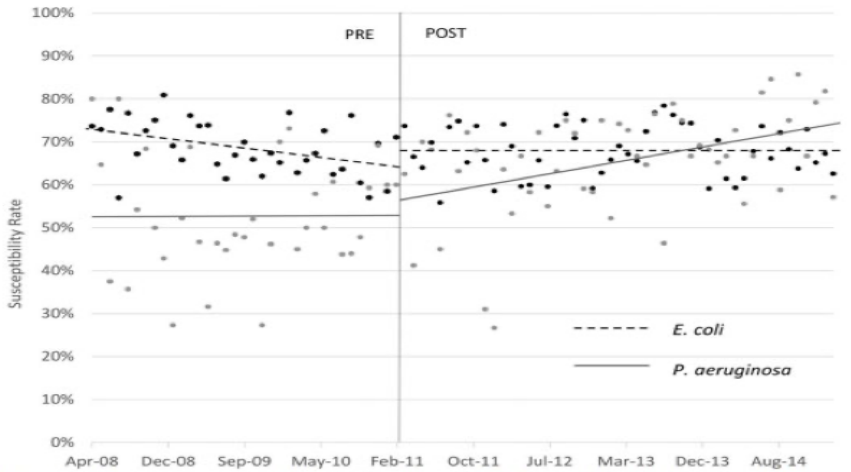


FIG 1 Antimicrobial utilization before and after ciprofloxacin selective reporting.



IG 2 *E. coli* and *P. aeruginosa* susceptibility to ciprofloxacin before and after selective susceptibility reporting.

Langford BJ, et al. J Clin Microbiol.2016; 54:2343-2347

Culture Reporting (Two Stage Reporting: The UK Model)

Team 1 :

Technical Reporting

- Technologist
- Resident

Team 2:

Cl. Micro. Reporting

- Consultant
- Senior resident

Cascading reporting

- “strategy of reporting antimicrobial susceptibility test results in which secondary (e.g., broader-spectrum, more costly) agents may only be reported if an organism is resistant to primary agents within a particular drug class **(cascade reporting is one type of selective reporting)**.”
- susceptibilities are performed for a panel of antimicrobials but reported for only the narrowest-spectrum drugs (primary agents) while suppressing the susceptibilities of more broad-spectrum agents, higher-cost agents, high-toxicity agents or those with the potential for over prescription (secondary agents).

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Testing limitations

- In commercial AST systems, the suppression of results may also occur if the manufacturers has not obtained FDA approval for a specific antimicrobial agent/organism combination
- Inclusion of the the result into the patients report may be decided based on the AST result of other agents
- Results may be released to the clinicians with a warning comment

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Cumulative Antibiogram

- ✓Manual culture register
- ✓Excel based register
- ✓Information System design

Organisms		Susceptibility (%) for the year 2020											
		First-line agents						Second-line agents			Restricted agents		
	No of isolates	Ampicillin	Amoxyclav	Ceftriaxone	Cefotaxime	Ciprofloxacin	Gentamicin	Cefoperazone sulbactam		Amikacin	Meropenem	Tigecycline	Colistin
Escherichia coli	231	31	41	45	SP	41	52	71	78	91	92	95	96
Klebsiella pneumoniae	289	IR	31	33	SP	23	46	61	72	82	76	75	88
Acinetobacter baumanii	245	IR	IR	IR	SP	44	75	63	68	86	19	85	99
Salmonella Typhi	45	NT	NR	100	SP	23	CIN	NR	NR	CIN	NR	NBP	NR

Abbreviations:
For *Salmonella*, data for year 2019, 2020 are included

Susceptibility of cefotaxime can be inferred from ceftriaxone

Color coding	%S value
Green	> 80%
Yellow	60-80%
Red	≤ 60%
Gray	Data not available

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General Rules

- Generate cumulative antibiograms **at least annually**.
- Include **only final**, verified results
- Consider only species with antimicrobial susceptibility testing data for **at least 30 isolates** to guarantee statistical validity of the estimates.
- Calculate cumulative antibiograms preferably at **species level**.
- Calculate the **percentage susceptible** per species/antibiotic combination, and do not include isolates with intermediate susceptibility.
- Include **only diagnostic** isolates, but not isolates from surveillance and screening cultures or from non-patient sources.

Handling Multiple Isolates

- All isolates strategy: all isolates of a given species collected during the time period considered equally
- First isolate strategy: only the first isolate of a given species per patient per analysis period is considered (= CLSI recommendation)
- Episode-based strategy: duplicate isolates are included when the minimal interval of time between their recovery was n days.
- Antibiogram-based strategy: duplicate isolates are selected with respect to their antimicrobial susceptibility
  - considering every isolate with a deviating antimicrobial susceptibility profile per patient
  - selecting the most resistant or the most susceptible isolate per patient, or
- Combination of strategies

- Courtesy Dr Nandini

- Report results only for antibiotics that are routinely tested
- Selective testing policies are common, including

(1)body site-specific testing (e.g., nitrofurantoin tested only for urinary tract isolates)

(2)second-line / cascade testing (i.e., second-line antimicrobials, such as tigecycline and colistin, tested merely on species with resistance to first-line antibiotics)

(3)prescribing-specific testing (i.e., only those antimicrobials tested which are requested or currently used for treatment)

Courtesy Dr Nandini

Comments in Clinical Microbiology Reporting

Review Article

Access this article online

Quick Response Code:

Website:
www.jacmjournal.org

DOI:
10.4103/jacm.jacm_34_21

Use of comments in clinical microbiology reporting: The need of the hour

Deepashree R, Sandhya Bhat[1], Apurba Sankar Sastry

Abstract:

The clinical microbiology reporting (CMR) for culture and antimicrobial susceptibility test (C and AST) is the most important investigation reported from a microbiology laboratory. However, majority of Indian microbiology laboratories generate a basic level C and AST report comprising of identification of the organism isolated with a list of antimicrobials and their susceptibility results, without any additional

Behavioral interventions

Microbiology Comment Nudge Improves Pneumonia Prescribing

Intervention: Respiratory cultures with no dominant organism growth and no *Pseudomonas* spp. or *Staphylococcus aureus* were reported by the clinical microbiology laboratory as:

Pre-Intervention Reporting:
"Commensal respiratory flora only"

Intervention Reporting:
"Commensal respiratory flora only:
No *S. aureus*/MRSA or *P. aeruginosa*"

Objective: De-escalation or discontinuation of anti-MRSA or anti-pseudomonal therapy

Design: quasi-experimental study conducted over 2 study periods: 6 month pre-intervention (Aug 2015 - Jan 2016) and 6 months following implementation of the intervention (Aug 2016 – Jan 2017)

Outcome	Pre-intervention (n=105)	Intervention (n=105)	P-value
De-escalation or discontinuation	39%	73%	<0.001
Acute kidney injury	31%	14%	0.003
All-cause mortality	30%	18%	0.052

- 5.5-fold increased odds of de-escalation (95% CI, 2.8-10.7)
- Duration of anti-MRSA and anti-pseudomonal therapy was reduced from 7 days to 5 days (p<0.001)
- No difference in ICU or hospital LOS

Musgrove MA, et al. Open Forum Infect Dis. 2018

MIC Based Report and Concept of BP-MIC Quotient (BMQ)

BLOOD CULTURE REPORT

MIC GUIDING TABLE

KLEBSIELLA PNEUMONIAE, VITEK AST PANEL AST N280

VITEK MIC DETECTION RANGE IN µg/mL FOR ANTIBIOTICS

Antibiotic	Detectable MIC Range lower than Susceptible MIC breakpoint					S Susceptible	I Intermediate	R Resistant	Detectable MIC Range higher than Resistant MIC breakpoint			
AMOXICILLIN CLAVULINATE				2.0	4.0	8.0	16.0	[32.0]				
CEFTRIAXONE						1.0	2.0	4.0	8.0	16.0	32.0	[64.0]
CIPROFLOXACIN						0.25	0.5	1.0	[2.0]	4.0		
GENTAMICIN				[1.0]	2.0	4.0	8.0	16.0				
TRIMETHOPRIM/ SULFAMETHOXAZOLE					20.0	40.0		80.0	160.0	[320.0]		
AMIKACIN			2.0	4.0	[8.0]	16.0	32.0	64.0				
CEFEPIME					1.0	[2.0]	4.0-8.0	16.0	32.0	64.0		
CEFOPERAZONE SULBACTUM					[8.0]	16.0	32.0	64.0				
PIPERACILLIN TAZOBACTUM				4.0	8.0	[16.0]	32.0-64.0	128.0				

Comment

GENTAMICIN IS DOC

BP-MIC-Quotient (BMQ)

ANTIBIOTIC

Ceftriaxone su
As gentamicin
As amikacin is

INFECTION CONTROL ADVICE

Kindly ensure appropriate infection control measures along with contact precautions:

Strict hand hygiene ensure that the five moments of hand hygiene are followed

PPE: appropriate PPE such as gown and gloves while handling the patients

Patient placement in isolation room; if not available, cohorting can be followed by placing the patients with similar infection together in same cubicle or corner of a ward

Ensure a spatial separation of 3 feet distance between beds with privacy curtain in-between

ANTIMICROBIAL SUSCEPTIBILITY TEST - VITEK **SAMPLE NO :** 307202102452

KLEBSIELLA PNEUMONIAE

		AST-VITEK		
Antimicrobial	**Line**	**MIC(ug/mL)**	**Interpretation**	**Therapeutic Index**
Amoxicillin clavulinate	First line	>= 32.0	R	Not Applicable
Ceftazidime	First line		R (Disk Diffusion)	Not Applicable
Ceftriaxone	First line	>= 64.0	R	Not Applicable
Gentamicin	First line	1.0	S	4
Ciprofloxacin	First line	2.0	R	Not Applicable
Trimethoprim/ sulfamethoxazole	First line	>= 320.0	R	Not Applicable
Cefepime	Second line	2.0	S	1
Cefoperazone sulbactum	Second line	8.0	S	2
Piperacillin tazobactam	Second line	16.0	S	1
Amikacin	Second line	8.0	S	2

• S-SENSITIVE (Indicates clinically effective when used in standard therapeutic dose.)

• R-RESISTANT (Indicates clinically ineffective when used in standard or increased therapeutic dose.)

Therapeutic index is calculated as susceptible breakpoint divided by MIC of the test isolate. Among the same line (spectrum) of antibiotics, higher the therapeutic index better is the efficacy.

Note the colony-antimicrobial susceptibility test (COLONY-AST) report. The reports highlighted in orange if any, are the changes noted from the preliminary

Distributing and Communicating Antibiogram Data

- Pocket Guides or Other Hard Copy
- Website Application

1. Portable Document Format (PDF)

- Smartphone, or Tablet Application

Mobile App
Antibiotic Policy
Integrated with Antibiogram

Turn Around Time

Properties	Laboratory-TAT	Ward-TAT	AIVIS-TAT
Duration between:	Specimen receipt and report authorized	Specimen collected and report received by the clinical team/ location	Decision of ordering the test and action-taken on the test report
Components	Pre-analytical: Sample verify time; Wait-time Analytical: Procedural time(C/S →ID→AST) Post-analytical: Authorization time	Lab-TAT plus Specimen transport time Report dispatch time	Ward TAT plus Hangover time Action taken time

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Interventions to reduce laboratory TAT

Preanalytical-TAT:

- Ensuring adequate workforce and resources (24X7)
- Increase in batch frequency of tests
- Timely procurement

Postanalytical-TAT:

- Multi-stage reporting
- Increase in frequency of reporting (twice a day, holiday and live reporting)

Analytical-TAT:

- Improving culture AST:
  - Automations in culture, ID, AST
  - Direct-ID and direct-AST
- Workflow modifications
  - 24X7 technician support
  - Rapid ID tests from the colony
  - Performing preliminary tests in parallel to the reporting
- Rapid point-of-care tests
- Rapid molecular tests

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Interventions to reduce Ward-TAT

Specimen transport time: improved by:

- Increasing the workforce for transporting
- Educational intervention
- Increased batching frequency
- Monitoring transport: 3-tired approach
- Setting rejection criteria
- Pneumatic tube transport

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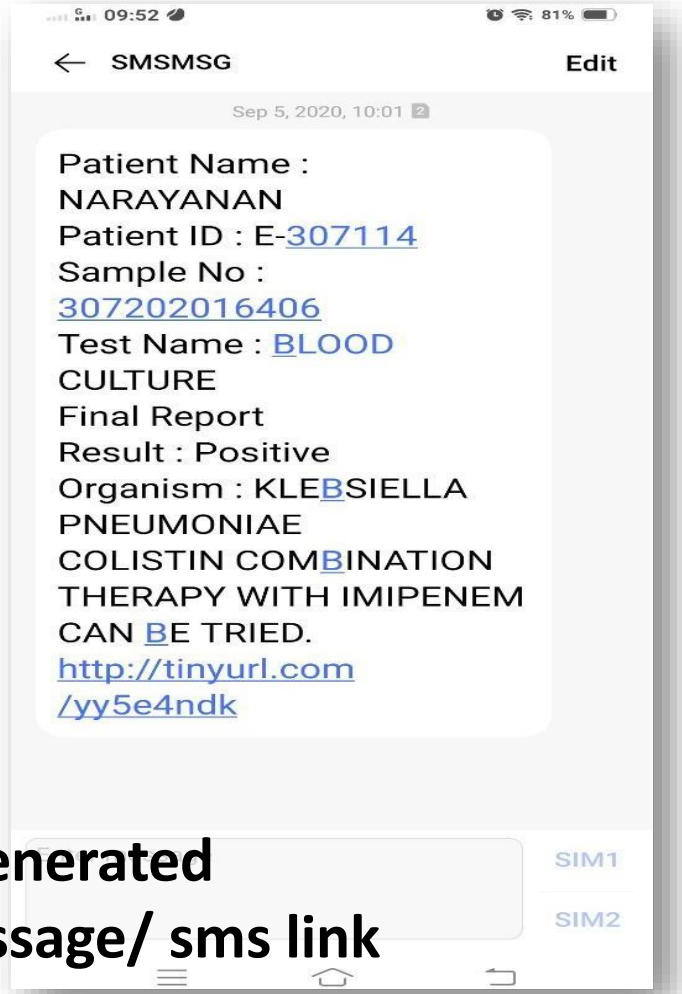
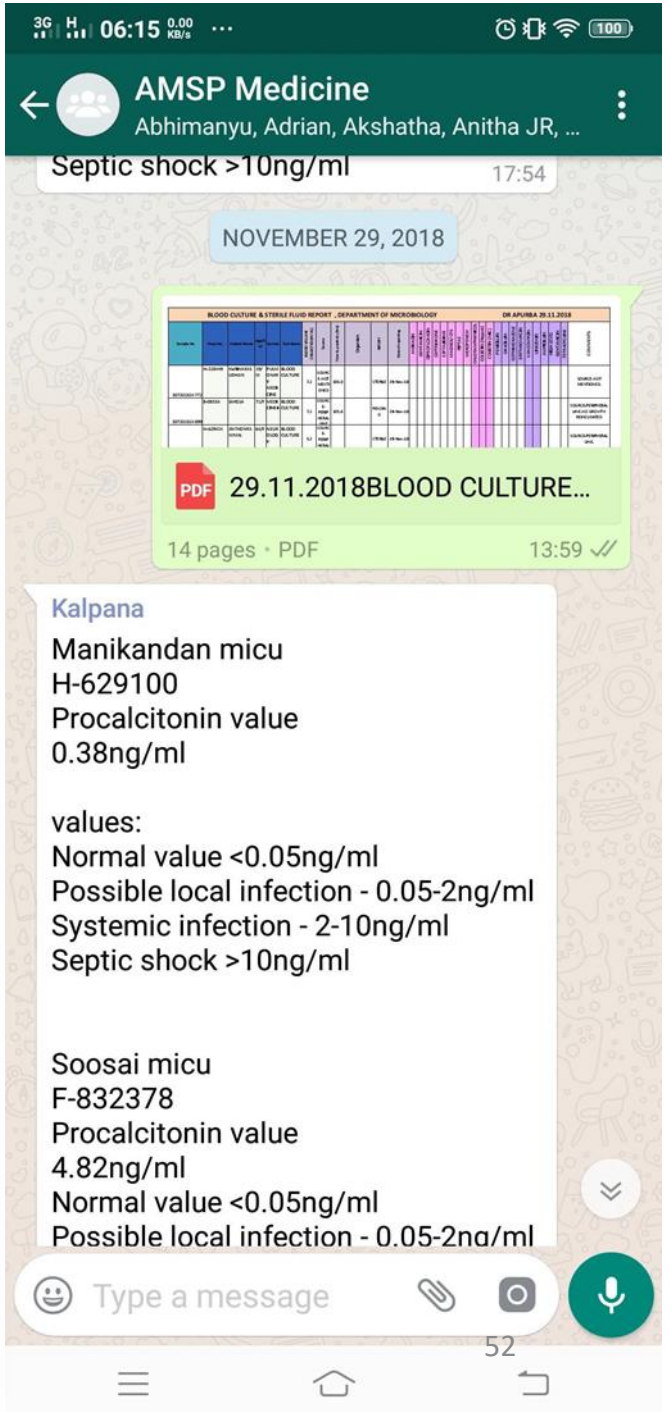
Report dispatch time improved by

- Increasing the workforce
- Increase the frequency for manual dispatch
- Spreadsheet based register or Whatsapp delivery
- LIS based authorization
- Software based authorization
- Autoauthorization of negative culture reports



Auto-generated Message/ sms link



Curtesy : Dr Apurba Sastry

Interventions to reduce AMS TAT

Hangover time: improved by:

- Appointment of dedicated staff (e.g., phlebotomist)
- Written communication to order a test
- Educating the clinical staff about the importance of TAT
- Monitoring and digital tracking of tests

Action-taken time: improved by:

- Pathogen directed- AMS audit
- Synchronized reporting with clinical round
- Critical alert
- Educational intervention to clinicians

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Pathogen Directed AMS audit

- Communicate with the clinical team-availablity of the report (level of direct microscopy, organism identification)
- Help the clinical team to understand the interpretation of the report
- Address their queries
- Decide on further course of action.

- Verbal communication over telephone
- Verbal communication –bedside
- Written communication

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Synchronized Reporting with Clinical Round

Advices during AMS round

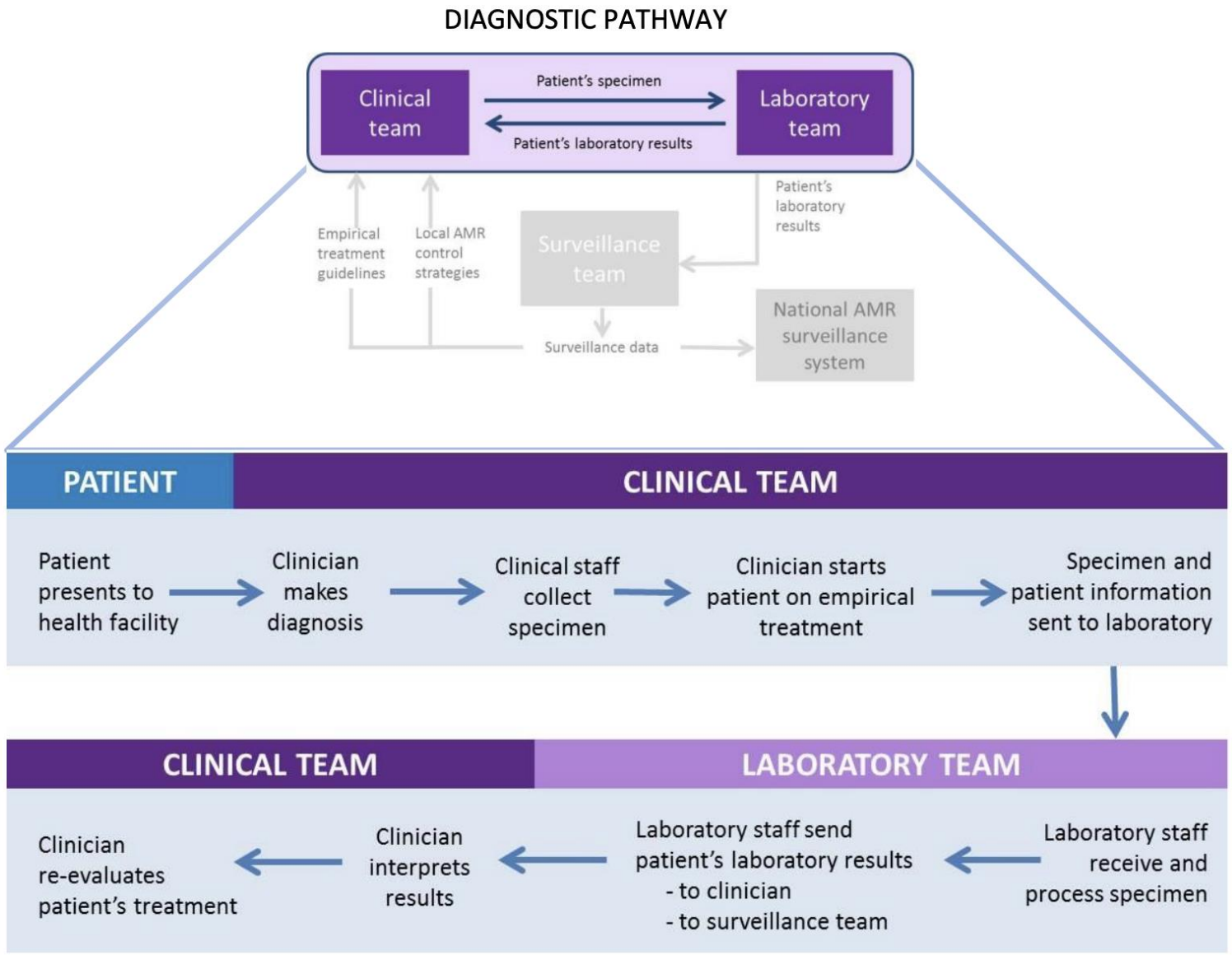
Cascading of antimicrobials
First Line
Amoxycillin clavulanate
Ceftriaxone
Gentamicin
Ciprofloxacin
Cotrimoxazole
Second line
Cefepime
Piperacillin Tazobactam
Cefoperazone sulbactam
Amikacin
Restricted or third Line
Meropenem
Imipenem
Ertapenem
Tigecycline
Minocycline
Colistin

AMS advice
EMPIRICALLY NO ANTIBIOTICS
Start antibiotic (1)
EMPIRICALLY CORRECT
Continue the current antibiotic (2)
NO ANTIBIOTICS EMPIRICALLY INCORRECT
Change of Spectrum (3)
Change Within the Spectrum
Escalation(4)
De-escalation
• Narrowing of spectrum (5)
• Remove overlapping spectrum (6)
• Remove redundant antibiotic(7)
• Stop the antibiotic(8)
•Switch from IV to oral(9)
Change of Antibiotics
Within the line(10)
Across the line(11)
Administrative advice

Courtesy: Dr Apurba Sastry

Educational Interventions to Clinicians

- Interpretation of susceptibility reports
- Understanding the workflow of the laboratory
- Interpretation of antibiogram data
- Knowledge regarding sample collection, transport and rational use of antimicrobials

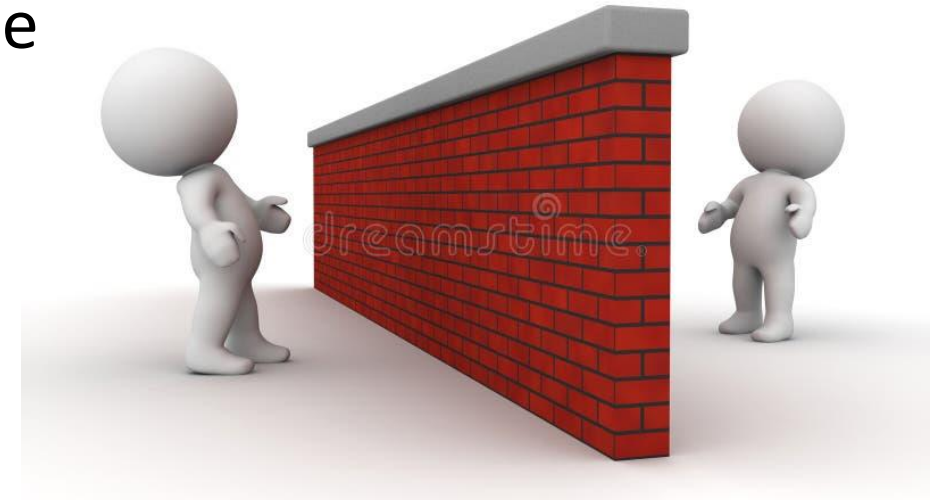


“ SMART” Laboratory

Communication Barriers

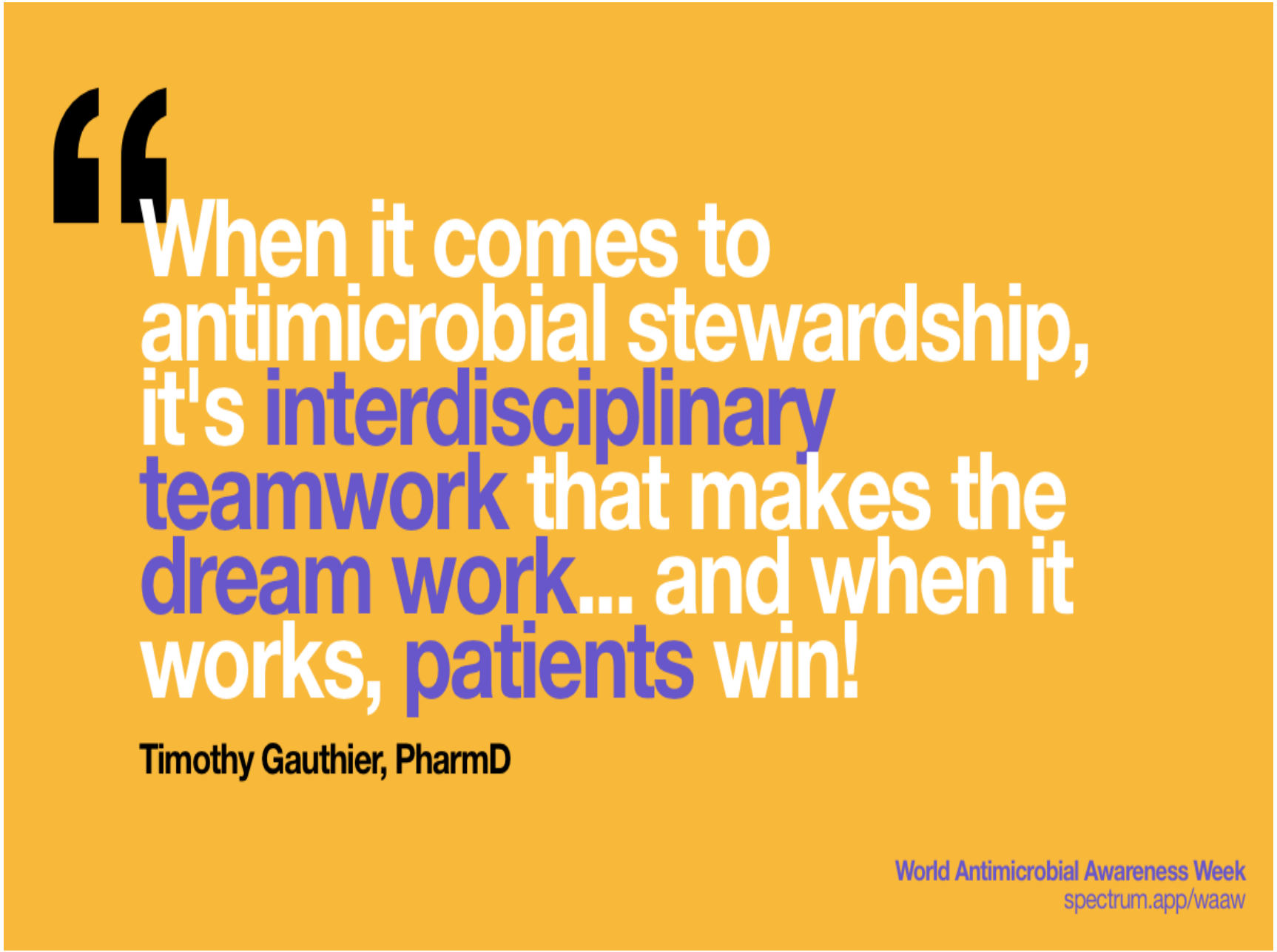
- Trust deficit
- No action on reports
- No culture of walking to talk
- No joint rounds
- Lack of confidence

Handshake stewardship



Take home message

- **Provide timely, reliable and reproducible identification and antimicrobial susceptibility results**
- **Optimize communication of test results and alert system**
- **Collaboration with ID physicians on updating methods for susceptibility testing**
- **Participate in the development, revise and publicize antibiogram reports consistent with CLSI guidelines**
- **Provide guidance for adequate specimen collection**
- **To evaluate the POCT tests**


“When it comes to antimicrobial stewardship, it's interdisciplinary teamwork that makes the dream work... and when it works, patients win!
Timothy Gauthier, PharmD
World Antimicrobial Awareness Week
spectrum.app/waaw

Thank You!