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# Biomedical Scientists Adding Value to Healthcare

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**EPBS**

European Association for Professions  
in Biomedical Science

# Critical Clinical Decisions

- Diabetes
- Leukaemia
- Cancer Diagnosis
- MRSA
- Blood Transfusion
- Cervical Screening
- Therapeutic Monitoring
- Targeting Therapy

Where are these diagnoses made?



# Biomedical Scientists - Added Value

- > 70% Clinical Decisions are based on a diagnostic test.
- <2% total healthcare budget
- =Value
- Without us they are just guessing!

# Diversity of Laboratory Medicine

Current Departments	Emerging Areas	Allied Specialties
Cellular Pathology	Coagulation	Management
Clinical Chemistry	Cryobiology	POCT
Cytology	Endocrinology	Quality
Haematology	Immunophenotyping	Risk Management
Immunology	Molecular Biology	Education and Training
Microbiology	Mycology	Surveillance
Tissue Typing	Serology	Haemovigilance
Transfusion Science	Toxicology	Health & Safety
Virology		Informatics

# Internal Market

- We need to convince ourselves of our own worth
  - Well Educated Workforce
    - Education programmes
    - Opportunity for Post Graduate Qualifications
  - Innovative
    - Eager to exploit new technologies
    - Facilitate scientific and clinical research
  - Quality Product
    - IQC, EQA
    - ISO 15189
- We bring added value

# Healthcare Community

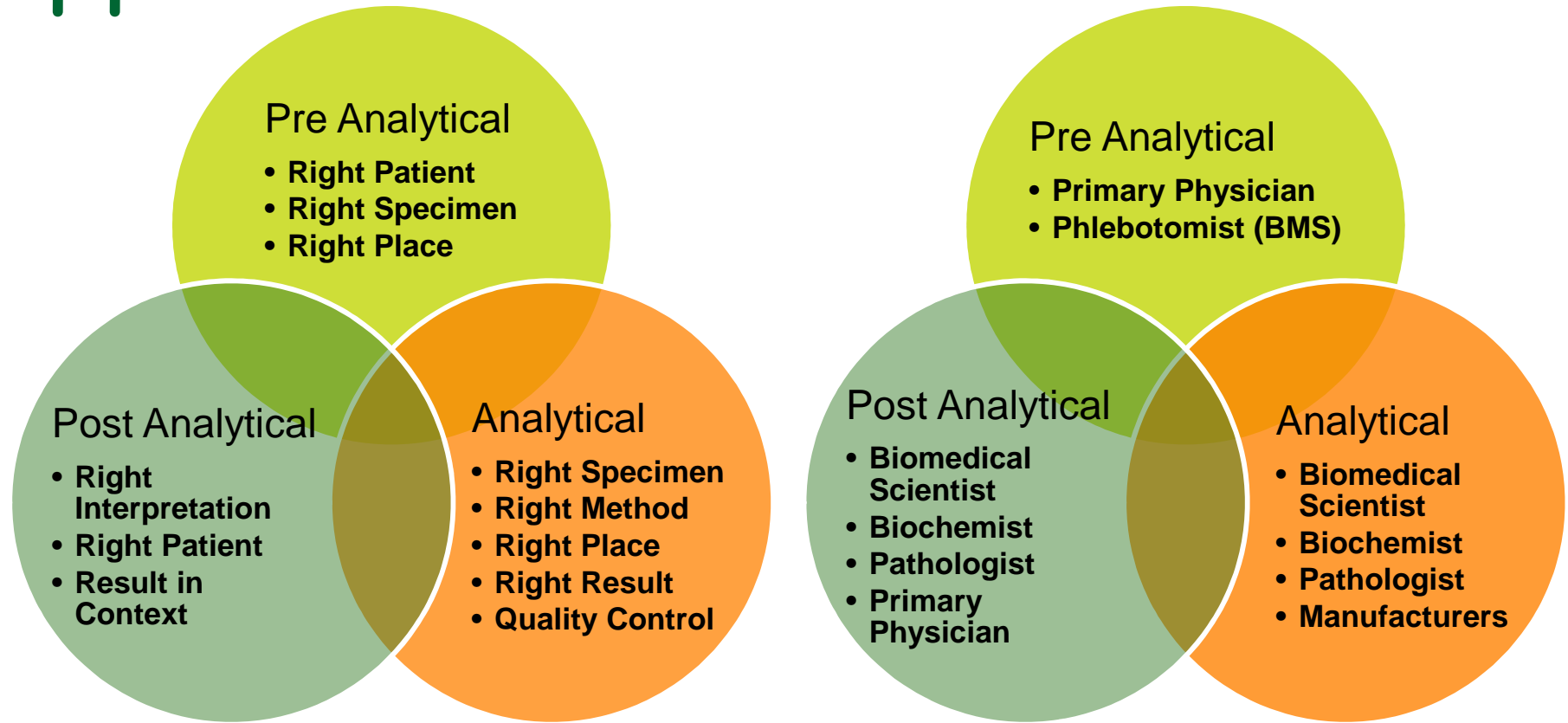
- How can Biomedical Scientists contribute to healthcare policy?
- Locally
  - 1<sup>o</sup>, 2<sup>o</sup> and 3<sup>o</sup> care
  - Interpretation of Results of Analysis
    - Place in context of patient's clinical condition and treatment
    - Patient education
    - Management of POCT
  - Advice on choice of tests
    - Diagnosis
    - Screening
  - Cost Benefit Analysis

# Wider Healthcare Community

- Nationally and Internationally
  - Participate in National and International Associations
  - Collaboration with other Laboratory Medicine Groups
  - Liaise with Policy Makers
    - Position papers,
    - Forum discussions
    - Meetings
  
- Publish!

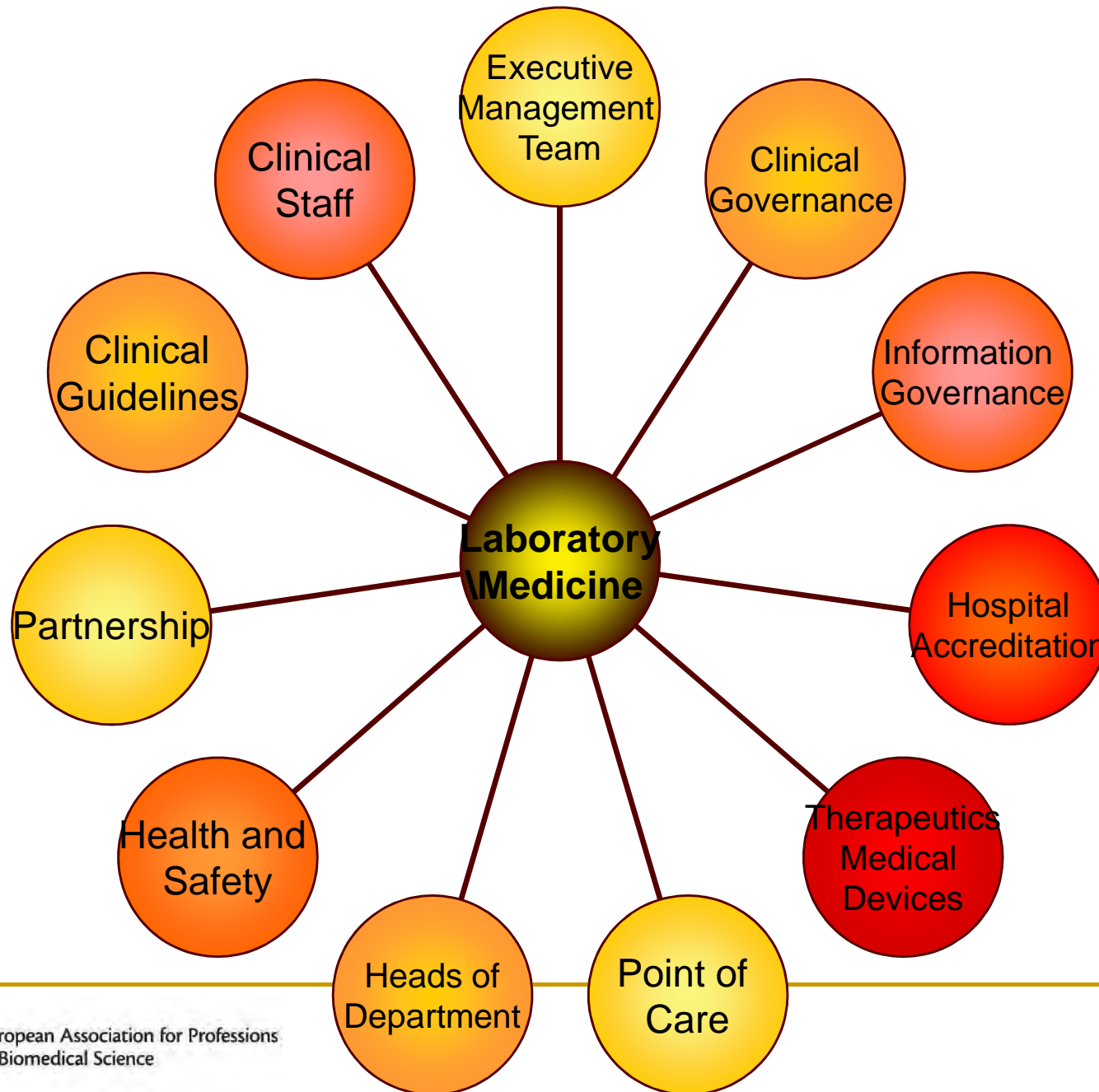
# Patient Safety: Approach

# Team

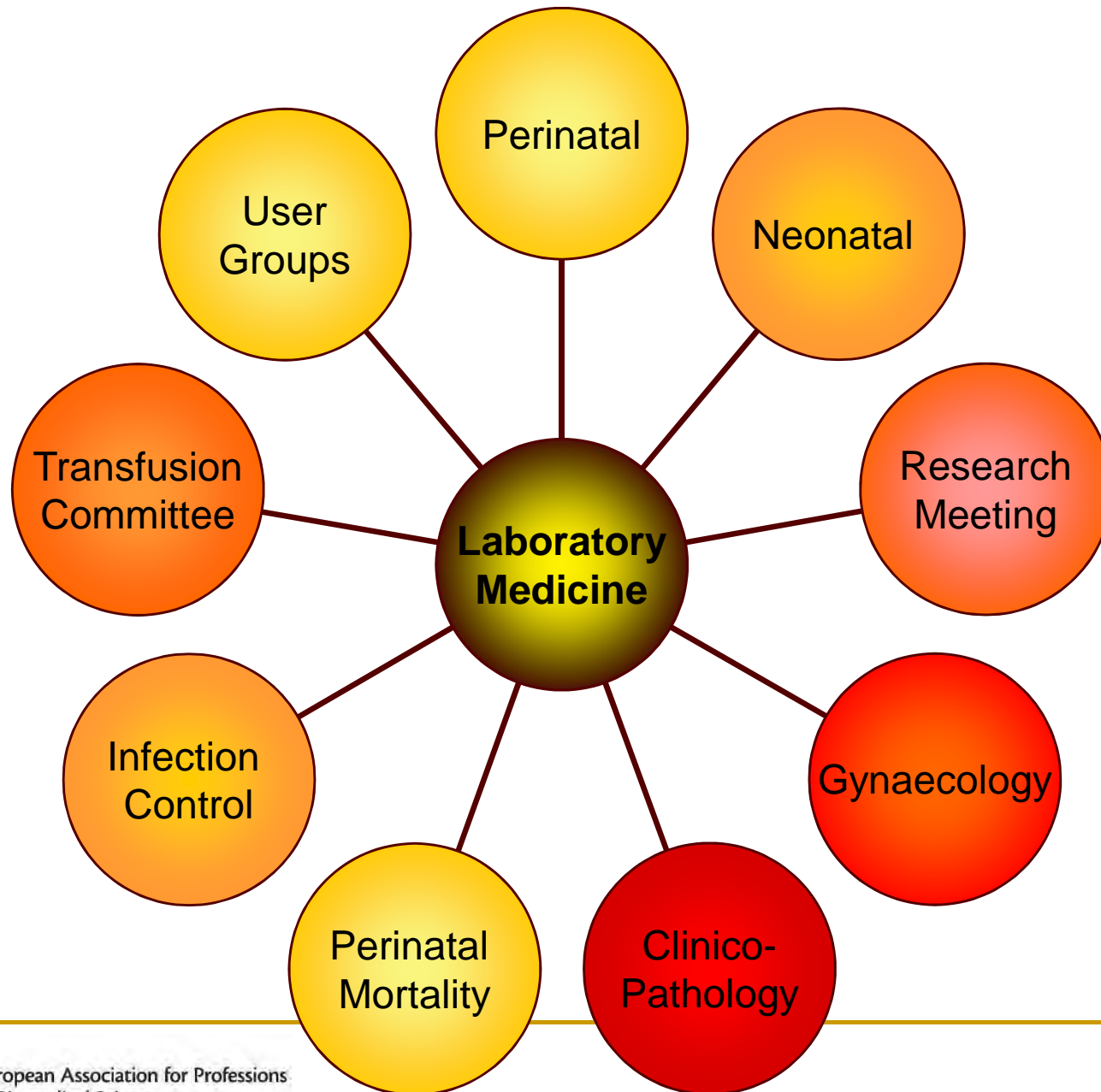




# Relationship with Hospital



# Clinical Commitment



# The Diagnostic Partner

## PURPOSE

1. Ensure a better course of treatment of the patient
2. Ensure a central position for biomedical laboratory scientists in the future health care system

## GOALS

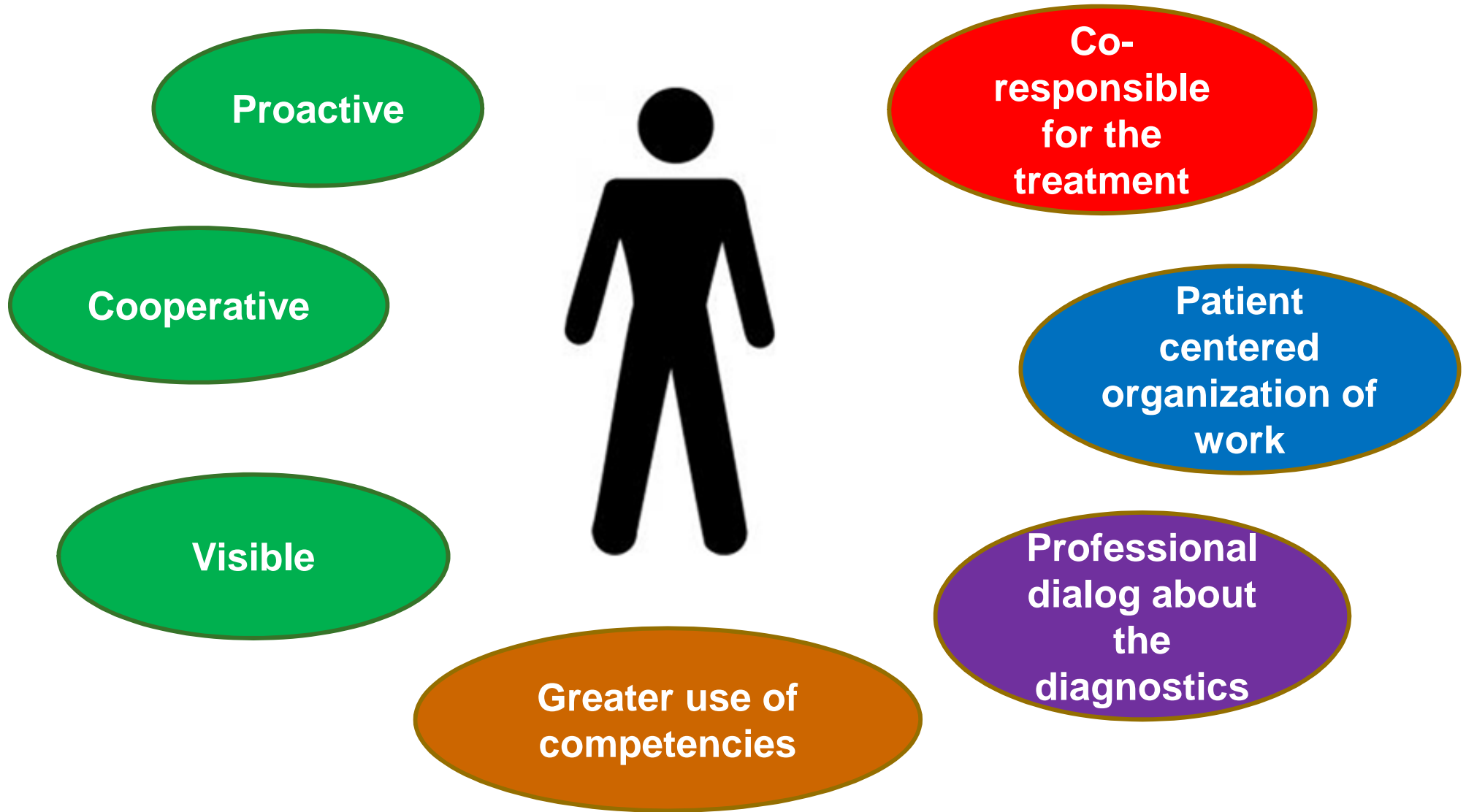
- New areas of work
- New ways of working
- New competencies

## THE CORE COMPETENCE

Ensuring the quality of the preanalysis, analysis and post analysis



# THE DIAGNOSTIC PARTNER - WHAT DOES IT MEAN?



# Direct Patient Contact

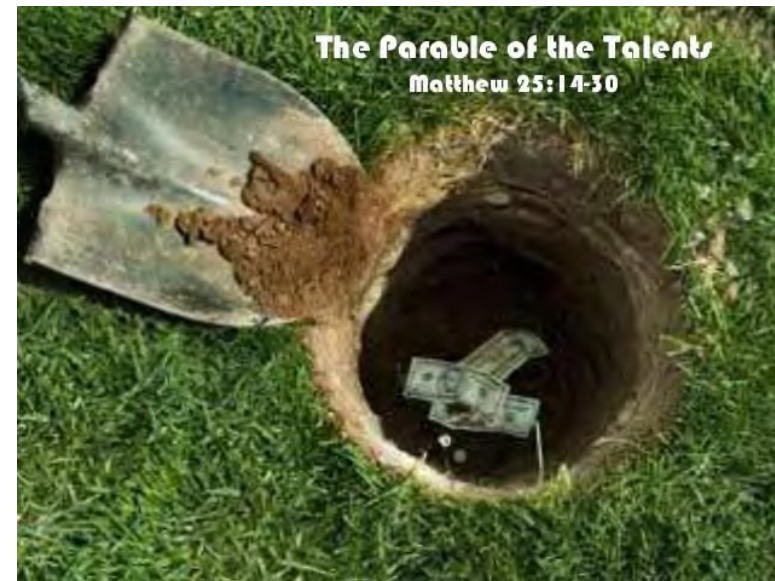
## ■ Disruptive Innovation

### □ Patient Interest

- Provision of service directly to patient within agreed treatment protocols
- Cooperation and collaboration with clinicians
- Exploit modern communication methods
- Triage patients

## ■ Advice

- Right test at right time
- POCT provided in community
  - Danish project



# Pathology and Technology

## Past 10 Years

- Lab automation
- Consolidation
- Hospital Based
- Laboratory Based

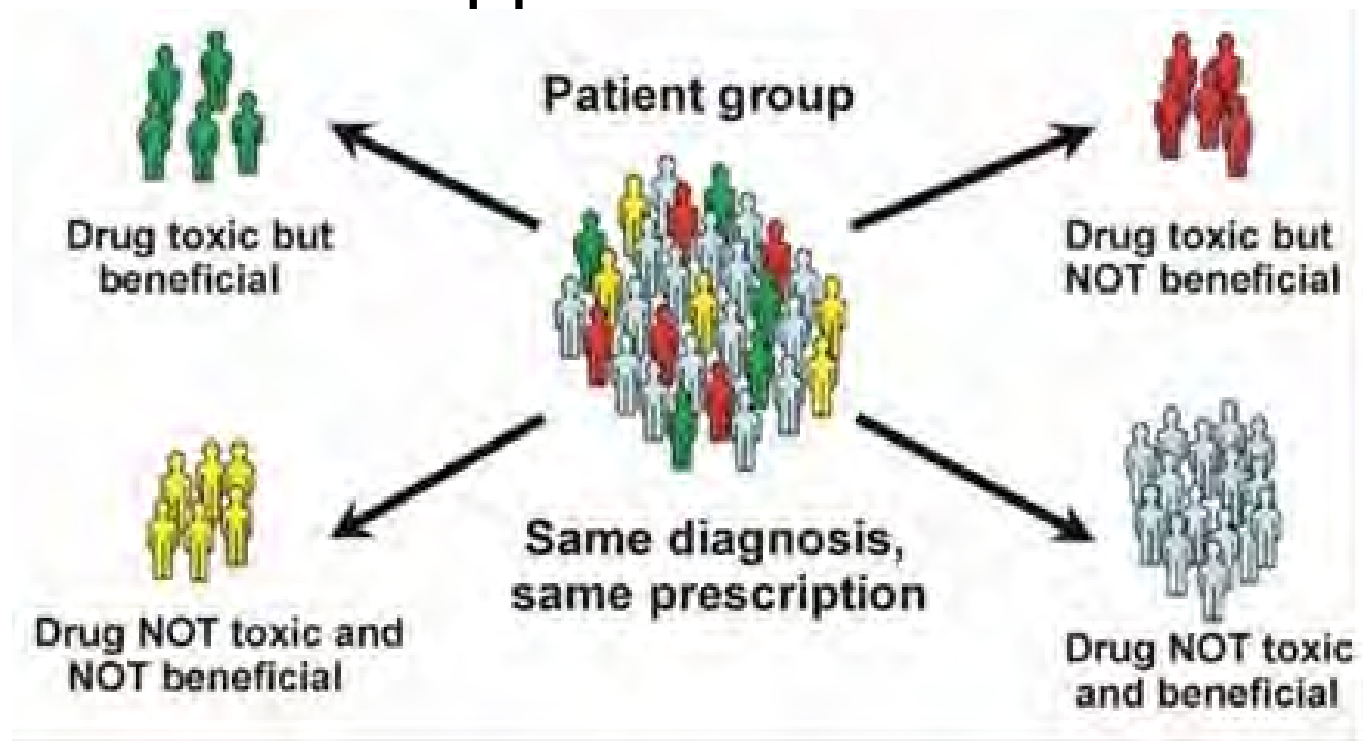
**Test/result service to a knowledge service, transforming clinical pathways and patient experience**

## Next 10 Years

- Lab on a chip / POCT
- Genetic / molecular technologies
- Digital technologies
- Distributed services
- Primary care/ outside the lab
- Self testing
- The patient

# Evidence Based Laboratory Medicine

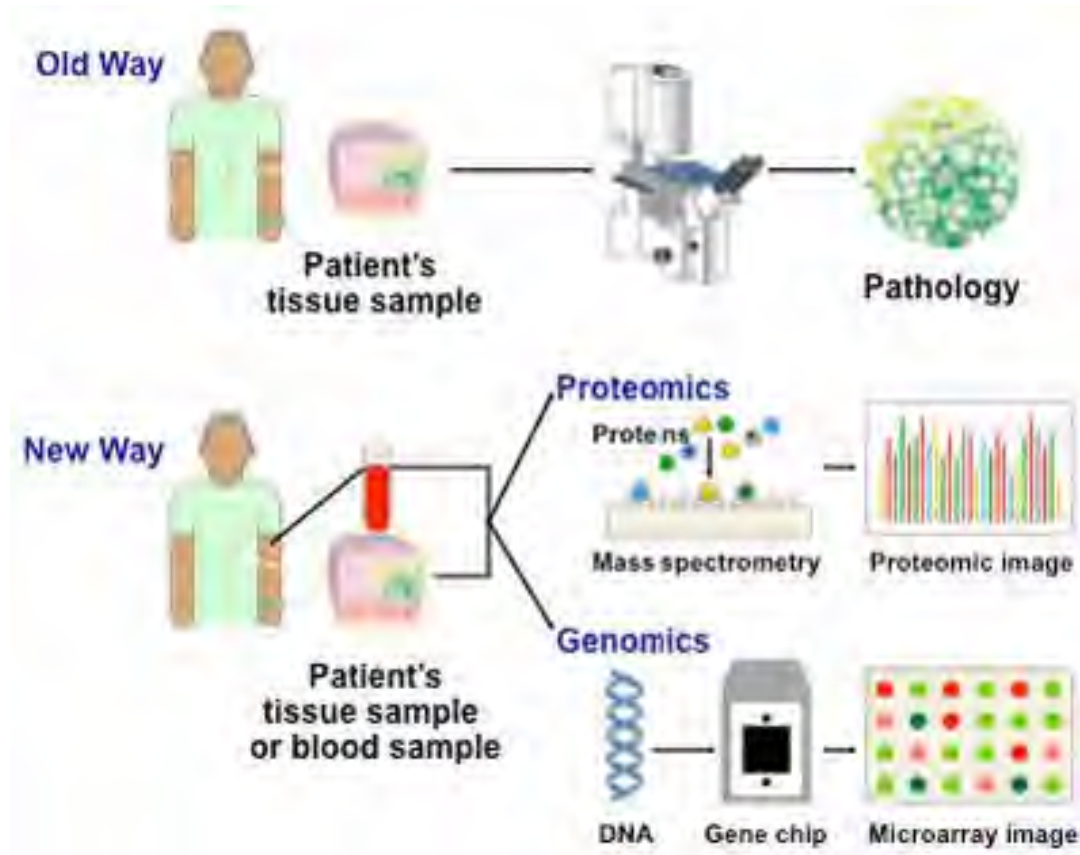
- Traditional Approach to Treatment



- But disease burden is rising

Image from: [http://sitemaker.umich.edu/hbhe669final/personalized\\_medicine](http://sitemaker.umich.edu/hbhe669final/personalized_medicine)

# Technology is Driving Change



Sequential testing

**Massively**  
parallel testing

From: [http://cisncancer.org/research/what\\_we\\_know/omics/personalized\\_medicine\\_07.html](http://cisncancer.org/research/what_we_know/omics/personalized_medicine_07.html)



# The Lab and POCT

- What has been our attitude to this phenomenon?
  - ❑ It will never catch on
  - ❑ The quality cannot be as good
  - ❑ Patients lives are at risk
  - ❑ We must stop it
  - ❑ I want nothing to do with this
  - ❑ Its too expensive
  
- **OVER MY DEAD BODY!**




# POCT and Clinical Care

- In 1980's what had the single largest impact on diabetes care?
  - Patient self testing
- Emergency Room Triage
  - ProBNP permits classification of patients presenting with shortness of breath to those requiring echocardiogram or who may be safely discharged
  - Expensive test but reduces cost of patient pathway
- Blood Gas analysis is now standard in most theatres and intensive care units
- We add value through Governance

# Clinical Partners

- Member of Clinical Team
  - Ward Liaison
  - Role in Emergency Medicine
  - Clinical Conference
  - Pre and Post Analytical Role
  - Care Pathways
- Advisory Services by Scientists
  - Consultant scientists in all areas
  - Specialists in defined areas
    - Histopathology, Diabetes care, Infection Control, Warfarin, Transfusion Science



Leaders  
in Point  
of Care  
Testing

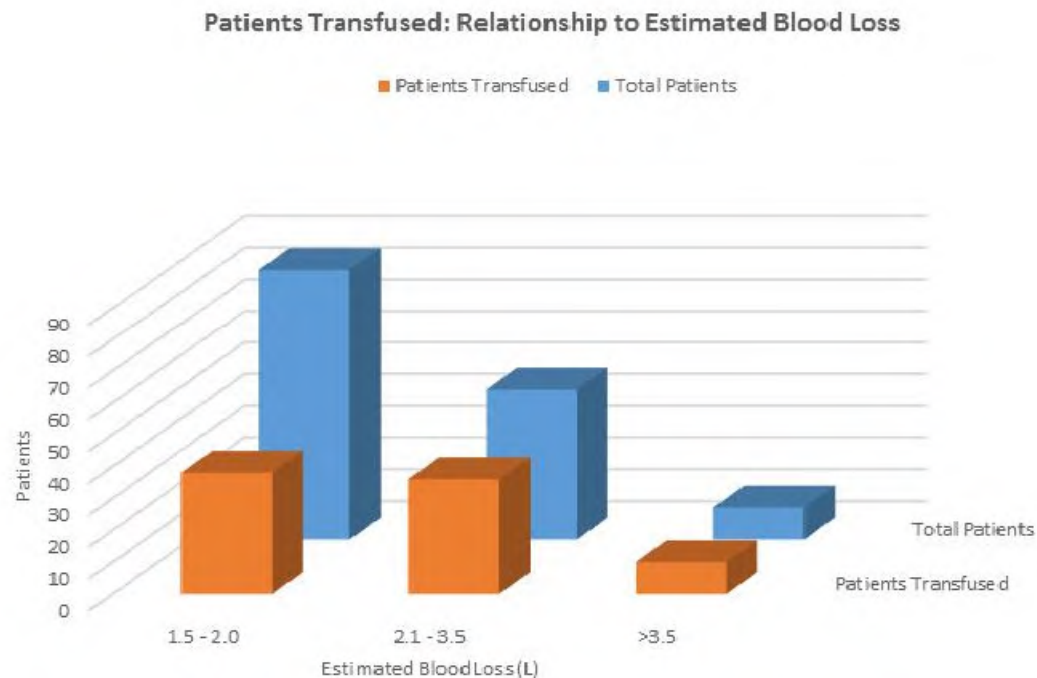
# Collaborate: We have the Data

- Present Data at Clinical Conference

- Statistics alter behaviour
- Post Partum Haemorrhage

- Savings in:

- Blood Products
- Time
- Avoidable transfusion



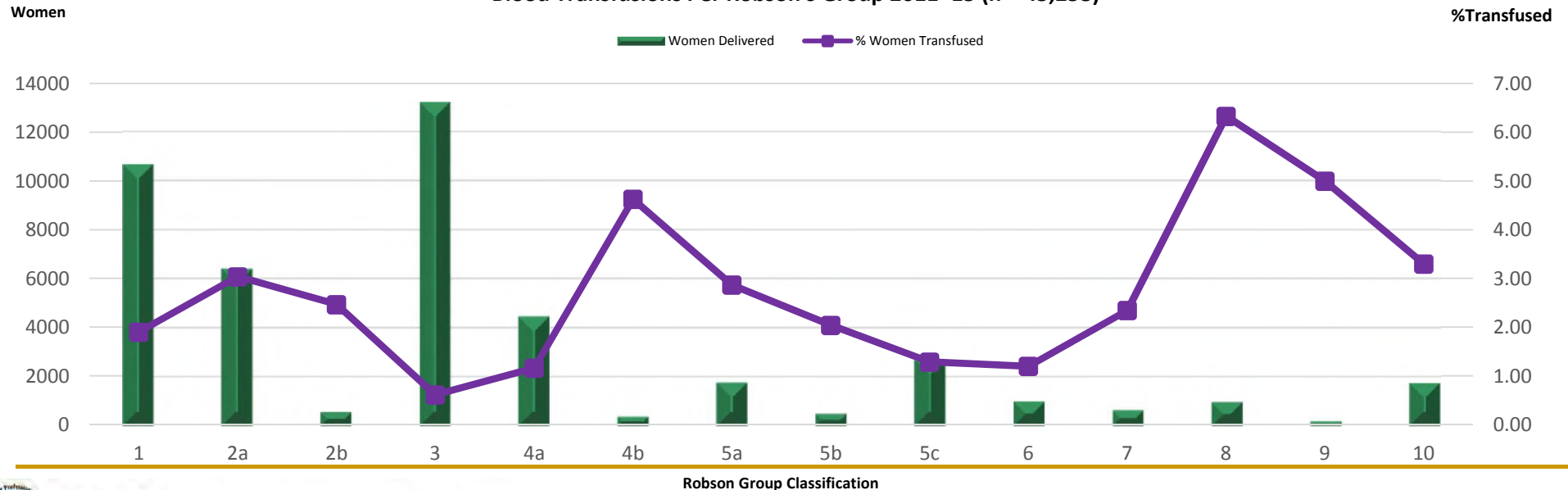
# Aggregated Data

- Robson 10 Groups
  - Classify Delivery

No.	Group
1	Nulliparous, single cephalic, >37 wks in spontaneous labor
2	Nulliparous, single cephalic, >37 wks, (a) induced or (b) CS before labor
3	Multiparous (excluding previous CS), single cephalic, >37 weeks in spontaneous labor
4	Multiparous (excluding previous CS), single cephalic, >37 weeks, (a) induced or (b) CS before labor
5	Previous CS, single cephalic, >37 weeks
6	All nulliparous breeches
7	All multiparous breeches (including previous CS)
8	All multiple pregnancies (including previous CS)
9	All abnormal lies (including previous CS)
10	All single cephalic, <36 wks (including previous CS)

2011 - 2015	1	2a	2b	3	4a	4b	5a	5b	5c	6	7	8	9	10	Total
% Women Transfused	1.90	3.04	2.46	0.61	1.16	4.63	2.87	2.04	1.29	1.20	2.34	6.33	5.00	3.30	1.80

Blood Transfusions Per Robson's Group 2011 -15 (n = 45,258)



# Prenatal Screening

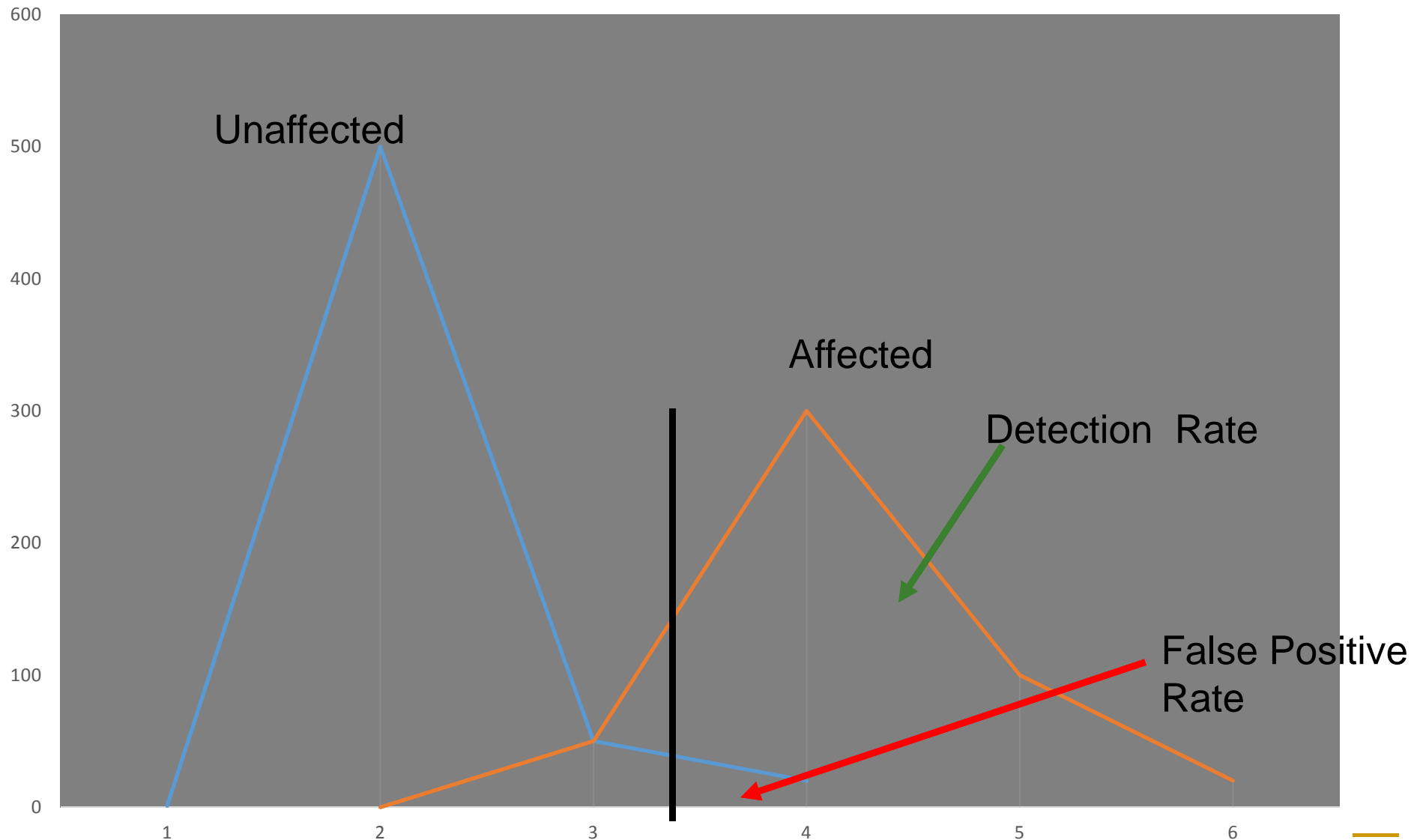
## ■ Goal

- Identify individuals at significant risk
- Justified when confirmatory tests carry risk or high cost
  - Also identifies those who are at very low risk

## ■ Screen Cut off

- Balance between
  - Detection Rate           % positive with condition
  - False Positive Rate   % positive without condition

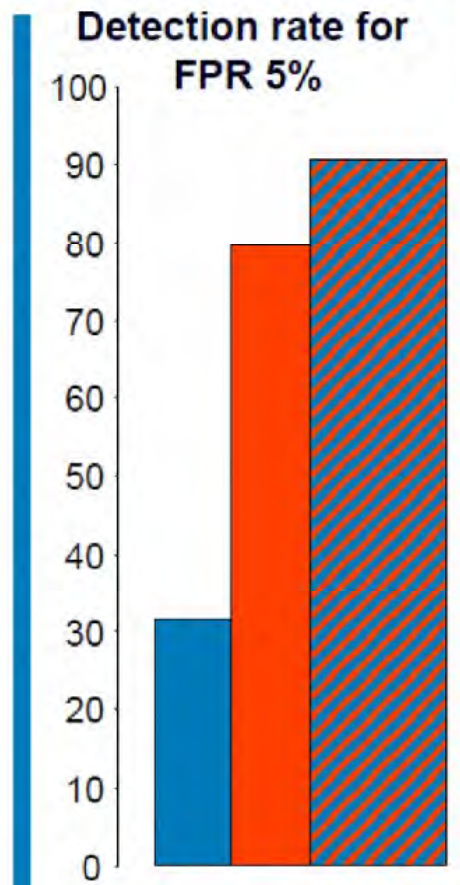
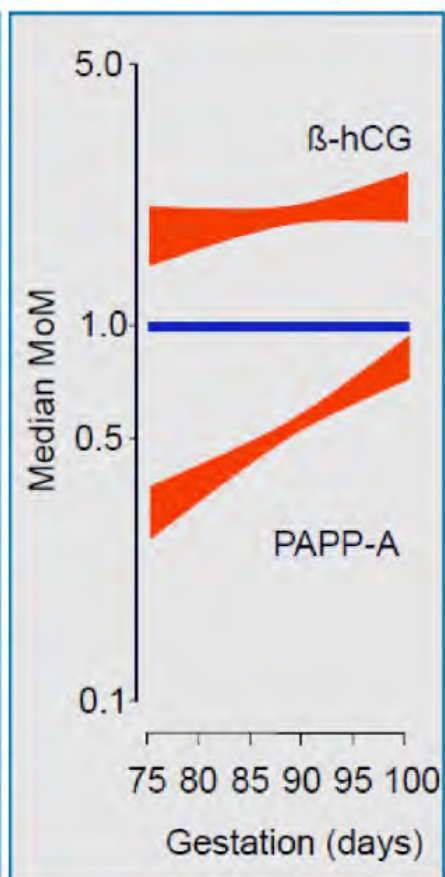
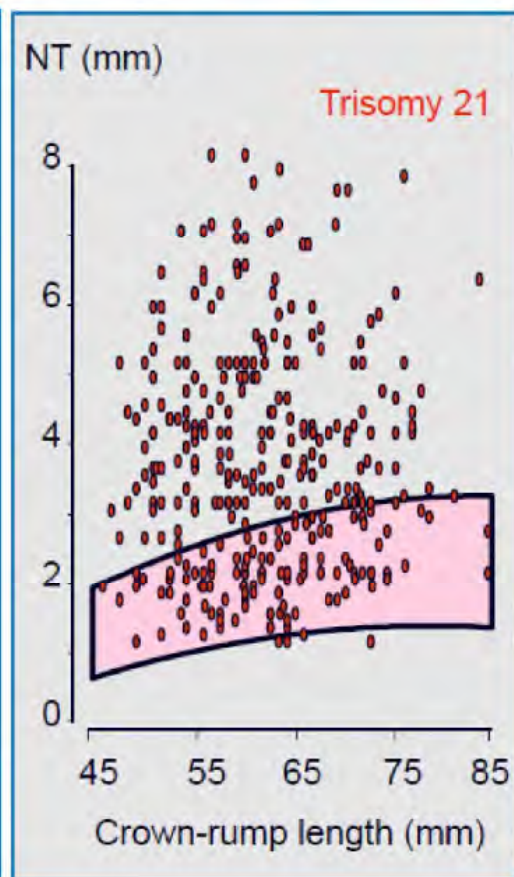
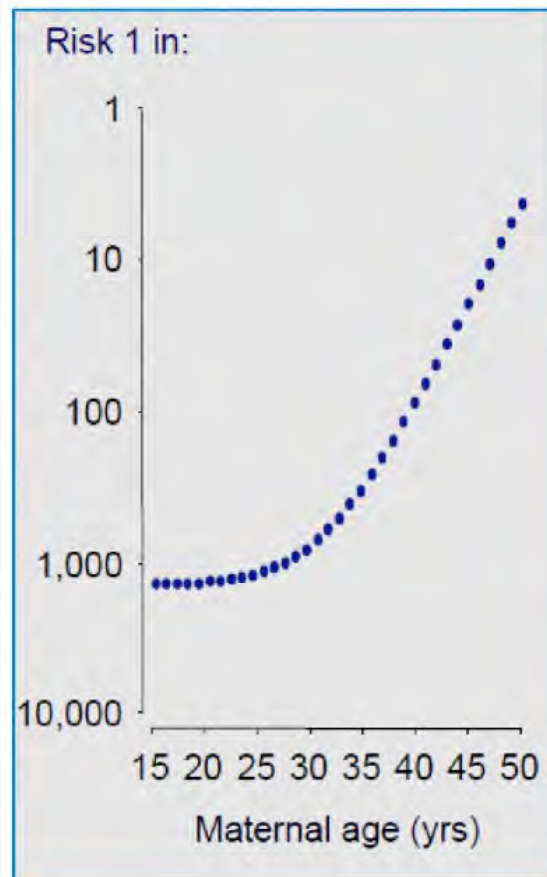
# Screening Variable





# Screening for trisomy 21

## Maternal age & fetal NT & serum $\beta$ -hCG and PAPP-A





# Odds of being affected if result is positive



- NIPT is an order of magnitude better than the current screening in reducing false positives and improving the OAPR
- In the FTCT, 9 women receive an invasive for every DS fetus confirmed
- With NIPT, in those women deemed high risk the OAPR is 5:6, therefore decreasing the number of invasive tests to confirm T13, 18 and 21

	<b>Cut-off</b>	<b>DR%</b>	<b>FPR%</b>	<b>OAPR</b>
Combined test	1 in 150	84	2.2	1:9 (11%)
NIPT	1 in 150	>99%	0.09 – 0.2*	5:6 (83%)

OAPR not 100% due to biology – remember CPM! \*Gils (2015)

# Summary

- Laboratory Medicine is about so much more than printed numbers on a page.
- Yes the accuracy and precision of these results is very important. But these tests are not a commodity that can be bought in a cut price supermarket.
- The true result of a laboratory investigation is knowledge. This transfer to knowledge is best achieved through close interaction between the examining clinician and all the providers within laboratory medicine, both the scientists and clinicians.
- This interaction is well managed through clinicopathological conferences and direct interaction between scientists and clinicians.

# Conclusion

- 'The life blood of industry is not capital equipment, but human capital' Bill Gates.
- We can expand this truism to encompass the Clinical Laboratory Service.
  - The life blood of our Clinical Laboratory Service is neither our automated equipment, nor our laboratory information systems. The human capital is vital to the enterprise.
- We must harness the human capital to add value

