The role of diagnostics in the management of antibiotic resistance

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The consequences of not having fast and reliable diagnostic tools

No diagnostic tools

blind (empirical) use of antibiotics

antibiotics over and mis-use

increasing resistance  treatment failure
Survival of patients depends on time to **effective** antibiotics

Kumar *et al.* 2006. *Crit Care Med.* Duration of hypotension before initiation of effective antimicrobial therapy is the critical determinant of survival in human septic shock
Clinical challenges

- Prescribe antibiotic only when bacterial infection is confirmed
- Use the right and efficient antibiotic

Is the patient infected?

No

With viruses?  No antibiotics

Yes

With bacteria?

Prescribe antibiotics

Use the **right** antibiotic (AB)

= Efficient, narrow spectrum, limited adverse effects, cheap
Clinical challenges

- Prescribe antibiotic only when bacterial infection is confirmed
- Use the right and efficient antibiotic

Is the patient infected?

No → No antibiotics

Yes → With viruses? Yes → Prescribe antibiotics

No → With bacteria? Yes → Prescribe antibiotics

Use the **right** antibiotic (AB)

= Efficient, narrow spectrum, limited adverse effects, cheap

Keep the AB choice → maintain the AB efficiency and Control resistance
Additional areas in need of diagnostics

- Surveillance
  - Trends and magnitude of resistance

- Collecting burden data
  - Estimating costs

- Clinical trials (new antibiotics)
  - Finding correct patient groups
Council Conclusions on innovative incentives for effective antibiotics

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– explore ways to promote further public-private partnerships between industry, academia, non-profit organisations and the healthcare system to facilitate research into new antibiotics, strategies for use of currently available antibiotics and diagnostic methods;

– ensure the development and use of integrated strategies to diminish the development and spread of antibiotic resistance as well as healthcare-associated infections and their consequences, encourage healthcare institutions to have structures in place as well as ensuring effective coordination of programmes focusing on diagnosis, antibiotic stewardship and infection control;
Current usage of diagnostic tools is low!

- **Industrialized countries**
  - 2% of health expenses but influence 60–70% of health decisions

- **Developing countries**
  - Spending on diagnostics ranges from negligible to 6%
The standard method has not changed for 50 years!

Day 1: Obtaining a pure culture. Species determination by biochemical testing

Day 2: Testing for antibiotic resistance
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Day 2: Testing for antibiotic resistance

OUTDATED!
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Slow and ancient diagnostics are compromising patient safety
What can we do about it?