

THE VALUE OF DIAGNOSTICS: the role of in vitro diagnostics in tackling antibiotic resistance



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In vitro diagnostics (IVDs) are an integral part of healthcare for patients. Blood, fluids or tissue are examples of the human samples required to perform such tests. They provide information necessary to complete the clinical picture of what is happening inside a patient. Yet, despite the name, IVDs are not just used to diagnose.

IVDs are used to test the safety of blood supplies by determining the blood group, they are used to screen for infectious agents and rule out possible causes of disease. The role of IVDs in monitoring conditions and treatment is increasingly important. Tests are particularly significant in an acute setting when the results often give a warning to changes in a patient status before physical symptoms appear. Whichever situation they are used in, IVDs support the clinical decision on an appropriate course of action.

Antibiotics have been in routine use for less than seventy five years but modern healthcare has come to depend heavily on them. Bacteria are highly adaptable and many have become resistant to the antibiotics being used. This is

... largest single threat to
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probably the largest single threat to modern healthcare. Couple this with very few new antibiotic drugs being available and we are in a situation where we could find ourselves without effective antibiotics for treating



... high prevalence of pneumococci
resistant to penicillin ...

many conditions in the near future. Hence the role of antibiotic stewardship has come into play to ensure appropriate prescribing. What roles can IVD tests play in tackling antibiotic resistance?

The public need to be aware that simple infections should not automatically mean a prescription from the GP. Many ailments can be overcome by the body's immune system with rest and palliative care. Simple IVDs are also available to determine the cause of common infections such as sore throats and vaginitis; these tools

are used effectively outside the UK to support decision making on treatment and helping the patient understand when an antibiotic wouldn't be effective.

When patients are admitted to hospital they are usually subjected to a battery of tests, often including CRP. But there are a number of other tests which specifically help to identify patients at risk of developing sepsis, a life threatening condition also known as blood poisoning which can rapidly overwhelm even apparently healthy adults, often fatally. Serum lactate is one test where



levels provide an early indication of an overwhelming infection if they rise rapidly and the test can also be used to monitor treatment as the level of serum lactate will be seen to fall as the patient recovers. Another test commonly used in managing sepsis is Procalcitonin (PCT).

IVDs can help identify the cause of infection and, if bacterial, can also identify the actual strain of bacteria allowing correct targeting of antibiotic therapy. Using the latest technology the turnaround time is much faster although traditional methods of culture are still in routine use. IVDs have been at the forefront of the fight against hospital acquired infection (HAI) such as

MRSA. These are caused by antibiotic resistant bacteria. Perversely, the most highly sensitive tests using a polymerase chain reaction (PCR), have not always been used. This is because they identify too many HAIs in a hospital which means the hospital fails to meet its target for HAI and could result in a fine. This unintended consequence of performance management of healthcare has meant less sensitive testing regimes being used on occasion.

The value of IVDs is not just limited to improving health outcomes and ensuring correct use of antibiotics, although this is the prime focus. But

The British In Vitro Diagnostics Association (BIVDA), is the national industry body for manufacturers and distributors of IVD products in the UK, representing more than 95% of the industry and over 100 organisations. These range from British start-up companies, often spinouts from Universities, through to UK subsidiaries of multinational corporations. BIVDA members currently employ more than 8,000 people in the UK and have a total industry turnover of just under £1 billion.

Case study in primary care: the value of using C-reactive protein (CRP)

The use of CRP testing in Northern Europe and Switzerland to differentiate between bacterial and viral infections in primary care is widespread and this has contributed to a traditionally restricted use of antibiotics and a low rate of antibiotic resistance.

The EU-financed project known as the HAPPY AUDIT took place in the winter of 2008/2009 in Denmark, Sweden, Lithuania, Russia, Spain and Argentina and involved more than 600 GPs to demonstrate whether improvements in the treatment of respiratory tract infections could be implemented via improved diagnostic procedures in primary care.

In the Baltic States, Russia and Southern Europe, where CRP usage is minimal, the prescription rate of antibiotics is much higher with a high prevalence of pneumococci resistant to penicillin as one of the consequences.

Overall, a relative reduction of 25% in the participating doctors' total prescribing of antibiotics was observed. In both acute sinusitis and bronchitis there was a clear association between the level of CRP and the prescribing of antibiotics and where CRP testing was not performed, significant numbers of patients received antibiotics which may not have been necessary. The full findings of the study are available from www.happyaudit.org.

... hospital fails to meet its target ...

identifying and treating infection quickly and effectively also can lead to significant savings in resource through reduced hospital stays and lower drug costs. As global health costs spiral, all economic efficiencies also need to be exploited and IVDs can play a big part in this.

The BIVDA member companies active in the area of microbiology are embarking on

an awareness programme to show the value of the IVDs they produce in targeting antibiotic resistance and supporting antibiotic stewardship. We would be happy to provide more information to anyone interested in this.

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