



**INFECTION
MANAGEMENT
COALITION**

Infection Management Coalition White Paper



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The following partners of the coalition have contributed to this White Paper:





FOREWORD



Dr David Jenkins,
President of the British Society
for Antimicrobial Chemotherapy

Much good and important work continues to be done through the collective effort to contain and control antimicrobial resistance (AMR).

But that's not enough. As per the first principle of open justice: it's vital that this work is not only done; it must also be seen to be done.

For how else will our work be raised to a level of consciousness that's hard to ignore for the people who really need to know about it? The policymakers, the opinionmakers, the investors, the patient groups.

AMR is a menace that persists beyond and outside the political timetables of administrations. Policy ambitions and other exigencies should not be allowed to distract politicians from the goals set out in the UK Government's 20-year vision of a world in which AMR is effectively contained, controlled and mitigated. We welcome the declarations made during the 2021 G7 conferences, as well as the appointment of Professor Dame Sally Davies as the first UK Special Envoy on AMR, but we know that there is much more left to do. Comprehensive, coordinated and coherent policy on AMR is vital but it has worth only if converted into effective action.

Consequently, the bleeding edge of science and medicine must now be made to meet the bleeding edge of public affairs and advocacy.

We need people invested with power and authority to give meaning to the commitments made at last summer's G7 summit, so that we can begin to develop a

consensus on national and international priorities – and move the question on from “what is the problem?” to “how are we going to solve the problem?”.

We need a bold and ambitious plan with specific and measurable targets, we need significant levels of “new money”, we need wider society to attribute more value to the fundamental importance of antibiotics – and we need these things now.

It is imperative that, through existing networks of world-leading infection specialists, we twist the lens in on a single example of how science can, and must, transform the approach to pandemic prevention and preparedness.

We need a united call for the establishment of a global network of laboratories – be they hospital-based, community-based, or mobile – that all work to a single baseline standard to track and report on rates of resistance to drugs that are of critical importance to modern medicine. Without such an early-warning defence network – without access to accurate and contemporaneous surveillance data, without knowing how to prescribe antimicrobial treatment – all other attempts at targeted support are likely to be compromised.



FOREWORD CONTINUED...

Indeed, the UK Government's own 20-year vision (of a world in which AMR is effectively contained, controlled, and mitigated), cannot be delivered without the extensive development of microbiology laboratories, especially in low- and middle-income countries where rates of resistance represent an unknown quantity, currently.

But to stand any chance of supporting this aim, learned societies, like ours, must now be recognised by NHS England (NHSE), The National Institute for Health and Care Excellence (NICE), Health Education England (HEE), the Wellcome Trust, and other similar organisations, as bodies eligible to apply for funding to support work that will deliver the measurable solutions needed, pragmatically and efficiently, both in terms of time and finance.

This all points to a new way of working.

We are encouraged to see for the first time, a diverse range of sectors and industries come together in partnership through this Coalition, to address the critical issue of infection management, to respond to the problem head on; and to drive forwards those urgent actions needed to tackle and avert the threat of a new, harsher pandemic that would have far greater impact than that seen with the COVID-19 pandemic. And that's why we, the British Society for Antimicrobial Chemotherapy (BSAC), commend this White Paper. Its summary of recommendations identifies owners, timelines, and required actions – with the aim of breaking new ground. It provides us all with a very timely point of focus around which to organise and advocate.

**WE ARE ENCOURAGED
TO SEE FOR THE FIRST
TIME, A DIVERSE RANGE OF
SECTORS AND INDUSTRIES
COME TOGETHER IN
PARTNERSHIP THROUGH
THIS COALITION**



Prior to the current COVID-19 pandemic, an infection was for most, simply “an infection” – a virus, bacteria, or other microbe, not normally present within the body, leading to an illness for which you could seek treatment from your GP.

INTRODUCTION



The Covid-19 pandemic has made people more conscious of their personal health than ever before and has created awareness of the devastating impact that infections can have. Indeed, those living with suppressed immune systems may have already been far more aware of the fatal risks posed by infection. We have all now witnessed how our individual actions can impact the health of others, and how an infectious disease causes grave global health and societal implications when there are no available preventive interventions or treatment options.

Access to effective antimicrobials underpins routine medical practice and provides life-saving treatments in all of healthcare but, as widely discussed, this basis of modern medicine is under critical threat. Antimicrobials allow a health service to run and enable cancer treatments, like chemotherapy, and operations, like caesarean sections, hip replacements, and bone marrow transplants, to be carried out. Concerningly, despite the need to develop new antimicrobials, the unattractive commercial return for developers and a development process which is long and complex, has meant that no new classes of antibiotics for medical use have been discovered or developed for several decades.

Resistance to antimicrobials is a natural biological phenomenon that can be accelerated and exacerbated by various human factors such as overuse or improper use of medicines, poor infection control practices, and increased global travel and trade. The increased use of any antimicrobial medicine can cause a selective pressure which – by killing susceptible microbes, allowing drug-resistant ones to survive and multiply – allows for the development of resistance.

The threat of AMR upon us now is an existential one, but it is not just AMR that will claim lives, per se. In the not-too-distant future, common infections may increasingly give rise to serious conditions like sepsis – due to the slow uptake of rapid, reliable diagnostics and a lack of novel antimicrobial agents in the pipeline. This situation is currently exacerbated by other global issues including lack of access to clean water and sub-standard sanitation; poor vaccine uptake in low-income countries; and ageing populations with multi-morbidity in high-income countries. In the absence of effective therapeutic options this combination of issues has the potential to become lethal.



INTRODUCTION CONTINUED...

In our efforts to tackle COVID-19, the scientific community came together in ways we had never seen before – realising there is just one common enemy in this virus, and everyone is doing all they can to fight it. Since the emergence of COVID-19, there have been hundreds of research programmes conducted around the world, drawing on the collective expertise of many different disciplines. It is through partnership and collaboration that this has been made possible. Whole organisations

are putting competitive differences aside to tackle the COVID-19 crisis, moving together with unprecedented speed to find solutions, and this same approach must be made for tackling antibiotic resistance.

Infection is managed across all specialties in healthcare because it is common and has diverse implications. To address AMR and to maintain antimicrobial stewardship, we need to approach infection management holistically.

WHAT IS SEPSIS AND WHY IS IT RELEVANT?¹

Sepsis is a condition caused by the body's immune system responding abnormally to an infection, which can lead to tissue damage, organ failure, and death. The infection can start anywhere in the body; it may be only in one part, or it may be widespread.

The immune system usually works to fight harmful bacteria, viruses, fungi, or to prevent infection. However, for reasons that are not fully understood, sometimes

the immune system goes into overdrive and starts to attack organs and other tissues. It can happen as a response to any injury or infection, anywhere in the body.

Sepsis occurs when infection management goes wrong and a severe infection is not halted. We believe the recommendations laid out in the White Paper, if implemented, will help to minimise the likelihood and impact of sepsis.

WHAT IS ANTIMICROBIAL STEWARDSHIP?²

Antimicrobial stewardship (AMS) is the term used to describe a coherent set of actions which promote the responsible use of antimicrobials at both the

individual level as well as the national and global level, and across human health, animal health and the environment.



Infection management should consider the following four pillars, and should address each with equal vigour, with due consideration to the whole:



1. OUTBREAK AND PANDEMIC PREPAREDNESS

including global systems surveillance, and a renewed focus on the research and development of new antibiotics.



2. INFECTION PREVENTION

including screening, sanitation, buildings and systems design, hygiene, healthy living, and vaccination.



3. RAPID RECOGNITION, DIAGNOSIS AND TREATMENT OF TIME-CRITICAL VIRAL AND BACTERIAL INFECTIONS

through public awareness, improved diagnosis, recognition and treatment through public health, health professional training and healthcare systems and pathway design.



4. ANTIMICROBIAL STEWARDSHIP

including streamlined therapeutic pipeline, clear deployment of effective antimicrobial prescribing, rapid diagnostics including pathogen identification and resistance, access standards for patients and infection risk tools, public awareness, and media advocacy.

A system which is resilient and mature with regard to the first three pillars will be best placed to effectively deliver antimicrobial stewardship (AMS).

Whilst much is being done to address AMS, support the development of new diagnostics and therapeutics and improve global systems surveillance, these are being addressed independently.

It is of immediate importance that professionals, policymakers, industry, the media, and the wider public become aware of a holistic approach to infection management.

Infection prevention, rapid diagnosis, pathogen identification and treatment of infection, robust AMS, and pandemic preparedness must all act as equal parts of a one health strategy.

**WE NEED
TO COMMUNICATE
THIS THREAT WITH
RELATABLE FORCE &
TANGIBLE ACTIONS**



The UK took on the Presidency of the G7 group of nations in 2021. Prime Minister Boris Johnson met with leaders of G7 nations, the EU and guest countries to agree on actions to help the world fight the pandemic and then build back better: to achieve a sustainable, resilient recovery after COVID-19.

SUMMARY OF RECOMMENDATIONS



Leaders took the learnings from the COVID-19 pandemic to highlight the importance of infection prevention and control measures to tackle AMR, targeting both healthcare-associated and community-associated infections.

This White Paper intends to support development of a roadmap that encourages further collaboration, in order to accelerate the creation of a system which is resilient and mature with regard to: outbreak and pandemic preparedness; infection prevention; rapid recognition, diagnosis and treatment of time-critical viral and bacterial infections; and to, ultimately, deliver effective AMS.

With this we hope to support the development of cohesive policy that will build on those G7 commitments and deliver immediate and long-term change for the better. This means working collectively to publish infection management plans that include plans for AMR; resourcing all areas equally; creating a task force of stakeholders with equal voices; implementing an infection registry with patient level data and real-time tracking; ensuring valued consideration of the antimicrobial and diagnostics pipeline and delivering systems integration of infection management.

The UK has already proven itself to be a global leader in AMR preparedness due to its holistic approach.³ As such, we believe that much of this is achievable within the systems and frameworks that already exist inside government, the NHS, and wider society. A combination of taking a collaborative approach, awareness and organisational change is required to drive these recommendations.

We do, however, also recognise that for some of the recommendations included within this report, additional central government funding is required. We have therefore included a section in the summary of recommendations that indicates where extra funding, organisational change or an increase in awareness is likely to be required and we recognise this will need to be considered by HM Treasury (HMT) as part of its annual spending review discussions.

Beginning on the next page is a summary of the Coalition's 29 recommendations.



INFECTION MANAGEMENT - DATA

Outcomes and prescribing data

	RECOMMENDATION	PROPOSED OWNERS	PROPOSED TIMELINE	REQUIREMENT
1	<p>The NHS to develop and implement a data registry using clinical, patient level data (rather than administrative data) for patients entering the health system with infection in order to monitor patient outcomes, and to track their recovery and future healthcare needs.</p> <p>BSAC has initiated an antimicrobial registry which tracks the clinical usage of such medicines. We suggest that this is expanded and adopted at scale.</p>	NHS Digital, UK Health Security Agency	By 2025	Government funding
2	An annual patient experience survey to be conducted to track the experiences of patients with infection using a set of pre-determined questions, similar to the National Cancer Patient Experience Survey.	NHS England and NHS Improvement	By 2025	Government funding
3	NHS policymakers to ensure Healthcare Professionals (HCPs) are mandated to input infection data using existing electronic patient record systems, that will allow the system to know exactly what antimicrobials work for patients. These records must also be shared in a compliant and timely manner between primary and secondary care whilst upholding patients' rights to privacy.	NHS policymakers	By 2030	Awareness

AMR mortality coding and death certification

	RECOMMENDATION	PROPOSED OWNERS	PROPOSED TIMELINE	REQUIREMENT
4	NHS to fully implement ICD-11 coding.	NHS	By 2025	Organisational change
5	Department of Health and Social Care (DHSC) to review its death certification policy to allow for sepsis, infection and AMR as actual causes of death to be registered.	DHSC	By 2025	Organisational change
6	Responsible bodies to collaborate to produce guidance that ensures a uniform approach to the accurate recording of infections, such as sepsis, as a cause of death on certificates.	NHS policymakers, British Medical Association (BMA), Office for National Statistics (ONS)	ASAP and following any review of death certification policy	Organisational change



Monitoring and surveillance

	RECOMMENDATION	PROPOSED OWNERS	PROPOSED TIMELINE	REQUIREMENT
7	Integrated Care Systems (ICSs) to be incentivised to drive quality improvement in how they screen and monitor for infection.	Government policymakers, ICS boards	2022 onwards	Government funding
8	NHS, where possible, to ensure that people can get tested for infection at home and where required, receive treatment at home.	NHS, ICSs, local government	2022 onwards	Organisational change
9	More robust, unified, and transparent monitoring and surveillance processes to be adopted by the UK Health Security Agency.	UK Health Security Agency	2022 onwards	Organisational change



INFECTION MANAGEMENT – DIAGNOSTICS AND TREATMENT

Bridging the diagnostic/therapeutic gap

	RECOMMENDATION	PROPOSED OWNERS	PROPOSED TIMELINE	REQUIREMENT
10	NICE to take an aligned and holistic approach to appraisals of new anti-infectives considering the clinical and economic value of diagnostics and therapeutics in partnership.	NICE	Over 2022 to include in NICE's programme manual	Organisational change
11	Industry and funding gatekeepers to give greater credence to diagnostic interventions, developed in tandem with therapeutics, that work earlier in the treatment pathway.	Industry, NHS England, NICE	2022 onwards	Awareness
12	To ensure greater integration of point of care (POC) diagnostics into the clinical space, with facilitation by laboratory teams.	Individual NHS Trusts/ ICSs	By 2025	Organisational change
13	To increase government investment in national health security by enabling industry investment in UK manufacturing and research.	DHSC/ Department of Business, Energy & Industrial Strategy (BEIS)	2022 onwards	Government funding

Creating a payment system fit for the future

	RECOMMENDATION	PROPOSED OWNERS	PROPOSED TIMELINE	REQUIREMENT
14	To maintain and expand the NICE NHSE&I subscription project for antimicrobials to foster an innovative pipeline of new therapeutics.	DHSC, NICE & NHSE&I	By 2025	Government funding
15	To make the MedTech Funding Mandate more ambitious in its scope, especially in the funding of diagnostics with higher upfront costs (that are unable to provide a net saving within the first year) but would otherwise bring a huge amount of benefit to the NHS.	NHS England	By 2025	Government funding
16	Industry, NHS and Government to work in partnership in developing the 5 Year national plan and to explore innovative approaches to the development of new antibiotics and cutting-edge rapid diagnostics. These need to be modelled in a more holistic manner in both funding and implementation. This includes wider cross functional thinking as well as the wider societal and economic impact.	Industry, NHS, NICE Government	2022 onwards	Government funding



INFECTION MANAGEMENT - END-TO-END CARE

Healthcare systems

	RECOMMENDATION	PROPOSED OWNERS	PROPOSED TIMELINE	REQUIREMENT
17	Trust-level data on infection management outcomes to be shared nationally to highlight areas that require support.	NHS Digital	By 2025	Organisational change
18	Commissioning criteria for optimal infection management to be developed.	ICSs	By 2025	Organisational change
19	ICSs to each set out their own infection management strategy.	ICSs	By 2023	Awareness

Primary care

	RECOMMENDATION	PROPOSED OWNERS	PROPOSED TIMELINE	REQUIREMENT
20	Primary Care Networks (PCNs) to assess how new ways of working might impact infection management.	PCNs and their clinical directors	By end 2022	Organisational change
21	NHS to provide vulnerable members of the community, eg by using the recently developed shielding list, with equipment such as thermometers, wearable technologies, and integrated apps to conduct simple 'at-home' tests and assess risk.	NHS, ICSs	2022 onwards	Government funding

Aftercare

	RECOMMENDATION	PROPOSED OWNERS	PROPOSED TIMELINE	REQUIREMENT
22	HCPs across primary and community care to be educated on post-sepsis syndrome.	Health Education England (HEE), Royal College of General Practitioners (RCGP)	2022 onwards	Awareness
23	ICU nurses to provide all infection (including sepsis) patients with educational information from patient support groups and charitable organisations, such as the UK Sepsis Trust.	Royal College of Nursing (RCN), NHS Trusts, UK Sepsis Trust	2022 onwards	Organisational change
24	DHSC to urgently conduct feasibility studies into routine rehabilitation of all patients admitted to hospital with severe infection, including sepsis.	DHSC & NHS	2022 onwards	Organisational change



INFECTION MANAGEMENT – AWARENESS AND EDUCATION

	RECOMMENDATION	PROPOSED OWNERS	PROPOSED TIMELINE	REQUIREMENT
25	Future government policy to regard infection management in its entirety, by broadening the approach to combatting AMR to include pandemic preparedness, infection prevention and rapid and accurate treatment of time-critical infection. Clarify this approach in amending the Government's next five-year AMR Action Plan to a five-year Infection Management Action Plan.	Government	2022 onwards	Awareness
26	Unite all stakeholders, via the UK Health Security Agency, in the development of a powerful public awareness campaign – highlighting the importance of appropriate hand hygiene by building on the awareness established as a result of COVID-19.	UK Health Security Agency	2022 onwards	Awareness
27	Education is essential to optimal AMS and should be mandated to ensure the behaviour change necessary to support the recommendations laid out in this White Paper. Local authority education and public health departments to collaborate to encourage education of infection management at local schools.	Department of Education, Local Government	By 2030	Awareness
28	Learned societies to be recognised by NHSE, NICE, HEE, the Wellcome Trust, and other similar organisations, as bodies eligible to apply for, or secure, funding for work that addresses and supports the implementation of the recommendations within this White Paper, alongside other eligible bodies like universities.	NHS, NICE, HEE, Wellcome NHS Trusts, other professional bodies and learned societies	2022 onwards	Awareness
29	Work together to establish the 'human face' of AMR: to elevate the issues faced to a level of public understanding and advocacy equivalent to that seen with other leading causes of death and morbidity such as cardiovascular disease (CVD), cancer and diabetes.	Government, Industry, Third Sector	2022 onwards	Awareness



With public awareness at an all-time high and the UK Government focused on delivering on its G7 pledges, the time to create and call for change in infection prevention and control is *now*.

THE INFECTION MANAGEMENT COALITION (IMC)



We are a wide-ranging Coalition of opinion leaders, policymakers, health professionals and their societies, the scientific community and industry. We are working together to address infection prevention, diagnosis, and effective treatment, and have access to expertise and information that can support the implementation of a more cohesive approach to infection management. Given our shared and common goal, and with the UK Government's commitment to address this, a unified approach is required.

We aim to drive change in support of holistic management and pandemic preparedness. Our overarching goal is to effect transformational change in the way infection is detected, monitored, prevented, and managed across all facets of the NHS and broader society by adopting a whole system approach.

We have outlined our call to action within this White Paper alongside our supporting recommendations as a first step to deliver against our collective aim of delivering transformational change that aligns to government policy and will benefit the NHS in delivery of effective patient treatment.



Our overarching goal is to effect transformational change in the way infection is detected, monitored, prevented, and managed across all facets of the NHS and broader society by adopting a whole system approach.



Our aim is to support engagement with the 'human face' of AMR – the patients, their families and carers, and the public. We want to tell the story behind the potential impact of this global threat and commend the Government for its leadership, whilst recognising that this cannot be achieved alone.

We recognise that routine operations and lifesaving treatments all rely on there being antimicrobials to hand. These are time-critical medicines used to treat infections at the right time and prevent them from escalating. At the moment, whilst the current pandemic has heightened the public's health awareness levels, resistance to antimicrobials remains an almost unknown issue. This White Paper is the first, vital step in driving transformational change.

THE IMC FUTURE PLEDGE



This Coalition aims to:

- Nurture a patient-centred, holistic approach to infection management by communicating the patient story
- Build effective public messaging to increase societal antimicrobial responsibility by working with patient advocates and relevant government departments and identifying appropriate channels for communication. This education programme will seek to:
 - Improve lifestyle and vaccination choices
 - Nurture partnerships with other organisations with broad public reach
 - Address health inequalities that are known to impact AMR outcomes
 - Offer models of incentivisation to drive sustained action on AMR
- Break down institutional siloes and make recommendations for action across all sections of society, including to the UK Government and to NHS system leaders, which are designed to influence policy and corporate social responsibility.



Harnessing the power of data is a big part of the solution to many health issues facing society today. Technological advances in gathering and storing data allows us to understand the size and the impact of many diseases. Data give policymakers the evidence needed to implement real-world solutions. Data also provide the tools required to monitor the success of various health interventions, both at the individual patient level and at scale – across larger populations.

INFECTION MANAGEMENT



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In the case of infection management, data approaches are not yet robust enough to improve our understanding of infection, nor our capacity to combat it effectively. This is especially the case with conditions such as sepsis. Nor at an NHS Trust level do we see

the kinds of data approaches required to effectively monitor infection management of patients as they move through the health and care system, and thus effectively address AMS.

OUTCOMES AND PRESCRIBING DATA

As rates of drug-resistant infections and sepsis continue to rise in the UK, we also need to collect patient outcomes data to shed light on the patient experience and long-term implications.^{4,5} Failure to understand the patient experience now, will hamper patient outcomes going forward.² Whilst gathering prescribing data will help to build a picture of the clinical elements of the patient journey, failing to capture patient experience and registry data will limit the ability of HCPs and policymakers to understand the impact of the methods used to manage infection.

BSAC has started to make significant headway in this regard with the development of the UK Antimicrobial Registry (UKAR), which engages academia, industry and clinicians to provide vital information about real-world usage of antimicrobial agents, to identify where real clinical unmet needs lies. The registry will capture real world usage of antimicrobial agents and identify where real clinical unmet need lies. There is a clear need to adopt this approach for the whole of the UK.⁶



Sepsis represents a huge burden on the NHS. Every year, it is estimated that more than 44,000 people die because of sepsis⁷ and 80,000 suffer permanent, life changing after-effects⁸. It is estimated that current practice for diagnosis and treatment could be costing the UK economy up to £15.6 billion annually.⁷

Beyond the clinical setting, we need to gather patient experience data to understand how severe infections affect other issues such as mental health and employment. The UK Sepsis Trust estimates that in 2020, there were just under 250,000 cases of sepsis, many of which were life changing.⁸ Furthermore, the ONS has estimated that one in 10 positive COVID-19 cases lead to symptoms lasting 12 weeks or longer.⁹ Given the high incidence of co-morbidity after poorly managed infection, such as post-sepsis syndrome and long COVID, it is likely that these cases will

amount to a large number of working days lost to the UK economy. Collecting this data for sepsis and severe infection will help policy makers in addressing these cross-societal impacts.

Therefore, the NHS urgently requires a comprehensive tracking system using pathogen and disease registries, as well as granular patient level data to understand patient experience.

Lastly, prescribing data systems must be bolstered across the NHS so that any HCP managing a patient, at any stage of the health and care system, can fully understand their patient's journey, and therefore optimise their treatment and management. This approach can ultimately form the local epidemiological picture for the ward, Trust, or service and inform optimum use of the available diagnostic and antimicrobial armoury.

RECOMMENDATION

The NHS to develop and implement a data registry using clinical, patient level data (rather than administrative data) for patients entering the health system with an infection; to monitor patient outcomes, and to track their recovery and future healthcare needs.

An annual patient experience survey to be conducted to track the experiences of patients with infection using a set of pre-defined questions, similar to the National Cancer Patient Experience Survey.

NHS policymakers to ensure HCPs are mandated to input infection data using existing electronic patient record systems, that will allow the system to know exactly what antimicrobials work for patients. These records must also be shared in a compliant and timely manner between primary and secondary care, whilst upholding patients' rights to privacy.



CASE STUDY

GREAT ORMOND STREET HOSPITAL (GOSH) EPIC ELECTRONIC PATIENT RECORD (EPR) SYSTEM.^{10,11}

In 2019, GOSH went live with its EPR system, 'Epic', after three years of planning.

Epic is an online system that brings together all patient information in one place, to be accessed by a patient's entire clinical team, as well as giving patients and families access to information about their care, including appointments and test results.

By doing so, it enables both clinicians and patients to have a 360° view of previous antimicrobial interventions – and their efficacy – to ensure that best practice infection management is embedded within the system.

AMR MORTALITY CODING AND DEATH CERTIFICATION

Currently the coding system used across the NHS to diagnose infections and identify risk of sepsis is out of date and inaccurate.

Codes in ICD-10, the tenth edition of the International Classification of Diseases (ICD) make it difficult for HCPs to accurately record sepsis incidences, thus leading to inaccurate or limited data sets. As Tidswell et al. comment '...the lack of accurate diagnosis and coding, and inconsistent terminology compromise accurate epidemiology, a true appreciation of the magnitude of the healthcare problem, monitoring of the impact of treatment strategies, and evaluation of novel therapeutics and diagnostics.'¹²

As with most severe infections, sepsis is not consistently recorded on death certificates as it is often not considered to be the underlying cause of death, rather a complication caused by the underlying condition. This hampers the health system's ability to grasp how many people are dying from sepsis or infection-related conditions across the UK.

For conditions like pneumonia, which is a common complication of many severe diseases, the ICD-10 coding system provides clear specifications on how to handle coding such a condition – the same is not true for sepsis. Given the ICD codes are international, this is a worldwide problem. The updated version of the ICD – ICD-11 – has a more robust definition of sepsis, but is not yet implemented by the NHS. ICD-11 classifies sepsis as an all-encompassing umbrella syndrome covering a wide range of pathogens (bacterial, viral, fungal, and parasitic). Although, Tidswell et al. state that '...ICD-11 still has codes for meaningless terminologies, such as septicaemia, chronic septic endometritis, and chronic meningococcal septicaemia.'¹²

Therefore, the NHS needs to enhance the mechanisms it uses to diagnose infection and recognise sepsis. This should translate into more accurate death certification, to give a clearer picture of infection mortality across the UK and allow the UK to become a global leader in infection management.



RECOMMENDATION

NHS to aim to fully implement ICD-11 coding by 2025.

DHSC to review its death certification policy to allow for sepsis, infection and AMR to be registered as an actual cause of death.

Responsible bodies to collaborate to produce guidance that ensures a uniform approach to the accurate recording of infections, such as sepsis, as a cause of death on certificates.

MONITORING AND SURVEILLANCE

The importance of infection monitoring, and surveillance has been highlighted during the COVID-19 pandemic. Surveillance systems used to monitor infectious patients coming into, and moving around, the healthcare system have improved considerably throughout the COVID-19 pandemic, yet for other infectious conditions, they remain inadequate. These improved infection surveillance practices must be embedded beyond the pandemic –

and applied to all infectious conditions – to prevent flaws that allow patients with infections to move ‘silently’ around the health system and in the community – going unnoticed, until it is too late.

The NHS therefore needs to be able to identify and diagnose infectious patients in a timely manner before a patient is ‘lost in the system’ and places others at risk. This will allow the health service to effectively manage infection in a more holistic way.

RECOMMENDATION

ICs to be incentivised to drive quality improvement in how they screen and monitor for infection.

NHS, where possible, to ensure that people can get tested for infection at home and, where required, receive treatment at home.

More robust, unified, and transparent monitoring and surveillance processes to be adopted by the UK Health Security Agency.



CASE STUDY

COVID-19 TESTING AT KING'S COLLEGE HOSPITAL - AN EXAMPLE OF BEST PRACTICE SURVEILLANCE.¹³

Over the course of the pandemic, and now, King's College Hospital NHS Foundation Trust has ensured that patients attending the hospital for inpatient treatment are screened for COVID-19 prior to admission.

If a person is coming in for planned 'emergency' surgery or treatment, King's will arrange for the patient to have a COVID-19 test, usually three days before their admission date. After the test, the patient will have to self-isolate until they come to hospital.

Treatment will only go ahead, as scheduled, if the test shows that the patient does not have COVID-19.



DIAGNOSTICS AND TREATMENT

BRIDGING THE DIAGNOSTIC-THERAPEUTIC GAP

Diagnostics and antimicrobial therapeutics are not paired closely enough within the healthcare system's current approach to infection management. To fully benefit from the advances made in the development and responsible provision of antimicrobials, therapeutics need to be paired with advanced, and now widely available, diagnostics.

Diagnostics can rapidly and accurately identify infections and inform the appropriate antimicrobial usage, thereby minimising the growth of drug-resistant pathogens and improving patient outcomes.

We must proactively avoid a situation in which significant resources have been used to create a new class of antimicrobials, only for these medicines to quickly succumb to resistance because we have not been able to efficiently identify and diagnose the type of infection. In order to deliver long-term solutions to infection management, appraisal of therapeutics and diagnostics must be considered in tandem. And, where already available, companion diagnostics should be used to support the provision of improved care and steps to address AMS, as recommended in the O'Neil report where tests inform prescriptions.¹⁴

**DIAGNOSTICS
CAN RAPIDLY AND
ACCURATELY
IDENTIFY INFECTIONS
AND INFORM THE
APPROPRIATE
ANTIMICROBIAL
USAGE**



Additionally, we must instil a behaviour change that avoids preferencing cheaper prescription antibiotics over more costly diagnostic testing. This represents poor AMS and compromises definitive diagnosis and treatment.

We welcome the greater emphasis placed upon diagnostics during the COVID-19 pandemic and believe that it is vital for the use of infection diagnostics to be expanded and further embedded within the health system.

RECOMMENDATION

NICE to take an aligned and holistic approach to appraisals of new anti-infectives considering the clinical and economic value of diagnostics and therapeutics in partnership.

Industry and funding gatekeepers to give greater credence to diagnostic interventions, developed in tandem with therapeutics, that work earlier in the treatment pathway.

To ensure greater integration of POC diagnostics into the clinical space, with facilitation by laboratory teams.

Government investment in National Health Security is required through enabling industry investment in UK manufacturing and research.

CREATING A PAYMENT SYSTEM FIT FOR THE FUTURE

In partnership, Government, industry, and the wider healthcare system, have made very promising steps to ensure the development of future antimicrobials, for which investment and research and development had previously been declining. A depleting stock of new antimicrobials means the defence against AMR gets weaker and weaker, until a point is reached when there is no last line of defence to fight treatment resistant infections.

No perfect infection diagnostic test yet exists, but there are already well-evidenced diagnostic approaches that can support safely reducing antibiotic overuse and help strategies to mitigate global AMR.

A significant step to address this issue is the impending project, commissioned by NICE, NHSE&I and the DHSC and due to be trialled in England in 2022 with a view to taking learnings before rolling out to the

devolved nations. This project will introduce a subscription style model where the value of antimicrobials is de-linked from the volume used and instead tethered to the value that such antimicrobials provide to the NHS. This model has been dubbed a "Netflix style" subscription model. Within this model, the Government pays in advance for access to antimicrobials, and subsequently on an annual basis. This is a reimbursement solution that works for all and provides further incentives for investment into a future research and development (R&D) antimicrobial pipeline. By applying an appropriate value to novel therapeutics the global investment in R&D and production of antimicrobials can become economically viable for industry again, whilst guaranteeing government access to an innovative pipeline of treatments. It is hoped that the model will stimulate R&D into new antimicrobials that can tackle the



drug-resistant infections which threaten to disrupt commonplace treatments, such as life-saving surgery and chemotherapy.

This approach embodies the AMS mindset – focusing on facilitating the responsible provision of antimicrobials where appropriate, as opposed to viewing antimicrobials from a volume-based value perspective.

Similarly, the NHS England MedTech Funding Mandate policy demonstrates an innovative approach to supporting commissioners and providers to use clinically effective and cost-saving diagnostics through a reimbursement model which incentivises their use. By encouraging the uptake of diagnostics, such as antigen or antibody tests, or polymerase chain reaction (PCR) tests, more infections can be identified and treated appropriately, thereby reducing the improper use of antimicrobials. This will support cost savings to the NHS and help slow the tide of drug-resistant infections across all healthcare settings.

Currently, however, the Mandate exercises very strict eligibility criteria, such as the need for cost savings to be realised within the first year. For the power of diagnostics

to be truly realised, mandatory funding should be made available to all diagnostics, including those which may not be cost-saving in year one, but would otherwise deliver a significant benefit to the population and potential cost-saving in the longer-term. Further, the technology selected by the MedTech Funding Mandate to date has not been linked to infectious disease. NICE and NHS England should focus their efforts on attracting new technology manufacturers to the UK to address this.

The UK is currently a world leader in taking an innovative approach to funding antimicrobial therapeutics. Government and industry collaboration has seen highly effective solutions being found, notably the recent partnerships between industry and the Government to ensure the rapid development and roll out of COVID-19 vaccinations. However, this needs to be matched by equal willingness to innovate in the funding of diagnostics. This approach should be fostered and capitalised on for infection management more widely. Further, that same willingness must be harnessed to enact transformational change – including how AMS efforts are implemented and ultimately, funded.

CASE STUDY

BIOMARKERS FOR AMS IN COVID-19 PATIENTS.

Although SARS-CoV-2 is a virus, patients hospitalised with COVID-19 frequently received empiric antibiotics to treat suspected or possible bacterial infection. An estimated 85% of patients were receiving antibiotics in the first wave of the pandemic, despite a ~7% incidence of bacterial co-infection.¹⁵

Protein biomarkers can help rationalise antibiotic therapy, the National Institute for Health Research (NIHR) funded PEACH study found that one such biomarker – procalcitonin (PCT) – was widely adopted in the NHS during the COVID-19 pandemic, and three UK studies published suggest that the tool can be used to safely withhold antibiotics.^{16,17,18,19}



RECOMMENDATION

To maintain and expand the NICE NHSE&I subscription project for antimicrobials to foster an innovative pipeline of new therapeutics.

To make the MedTech Funding Mandate more ambitious in its scope, especially in the funding of diagnostics with higher upfront costs (that are unable to provide a net saving within the first year) but would otherwise bring a huge amount of benefit to the NHS.

Industry, NHS, and Government to work in partnership to explore an innovative approach to both funding and implementation of cutting-edge rapid diagnostics, and to modelling cost in a more holistic manner, including wider cross-functional thinking, as well as consideration of the wider societal and economic impact.



END-TO-END CARE

Part of the infection management challenge is the need for the whole healthcare system to come together and end operating in siloes. A move towards integrated care, enshrined in the new Health and Care Bill, will push the legislative proposals to enhance that eventuality. However, a cultural change is also required to ensure that integration and shared working becomes commonplace.

A patient with infection might be picked up in primary care, or they might present in the ICU. Following which, a patient may have many more admissions back into the health and care system for the rest of their lives with conditions such as post-sepsis syndrome, and potentially long COVID. It is the duty of the Government and the NHS to ensure that these patients are accounted for, no matter where in the patient journey they are.

HEALTHCARE SYSTEMS

The DHSC's draft Health and Care Bill legislates for a geographical shift in the national commissioning landscape. In England, ICSs will take over the commissioning responsibilities of Clinical Commissioning Groups (CCGs). The place-based approach to population health management chimes well with the public health approach needed to effectively manage infection, such as COVID-19. In addition, from summer 2021, seven regional AMS pharmacists will report into the

national lead for pharmacy and prescribing for AMR at NHS England.

However, a commissioning approach to holistic infection management has never been taken. The shifting healthcare landscape of England has led increasingly to budget responsibility being held by a geographical group of providers. With budgets being tight and measured against outcomes, it is difficult to show the value of infection management, particularly if, as mentioned above, the data does not



exist to demonstrate it. Furthermore, it is difficult to show the value of something that might not have an immediate impact – for example, AMS in preparation for future resistance.

There are concerns regarding the risk of regional variation under the new ICS model when it comes to infection management. We already see variation between CCGs, even

when it comes to products recommended by NICE. There is a concern that this same variation could play out at a larger, regional level.

Therefore, budget holders need to be aware of the value that proper infection management can bring in the longer-term so that budgets can be appropriately allocated.

RECOMMENDATION

Trust-level data on infection management outcomes to be shared nationally to highlight areas that require support.

Commissioning criteria for optimal infection management to be developed.

ICCs to each set out their own infection management strategy.

PRIMARY CARE

COVID-19 has given rise to many innovative clinical solutions, that may not have otherwise occurred. For example, the rise in virtual GP appointments has been a helpful and welcome tool during the pandemic, helping to drive efficiencies and stop the spread of COVID-19. However, for patients with an infection, a missed in-person appointment can become problematic. When a consultation goes online, a GP is unlikely to be able to conduct basic observations (temperature, pulse rate, blood pressure and oxygen saturations) to determine the likelihood of infection.

This means that despite advances in digital technologies and access, patients with infection may be missed and experience poorer outcomes or even die as a result.

Primary care services must find ways of running these simple tests in the new digital GP consultation environment. This technological development has allowed access to primary healthcare at a time of significant need. However, clinicians treating such patients are currently forced to make assessments without the basic observations used to triage risk (e.g. temperature, pulse, oxygen saturations and blood pressure). This could mean performing in-person tests or supplying the most vulnerable people in the community with the right equipment, for example thermometers and pulse oximeters, to be able to perform these tests at home.



RECOMMENDATION

Primary Care Networks to assess how new ways of working might impact infection management.

NHS to provide vulnerable members of the community with the equipment, such as thermometers, wearable technologies, and integrated apps, needed to conduct simple tests and assess risk at home.

AFTERCARE

For many sepsis patients in the UK, aftercare has been an area where they have continually felt “let down”. Once patients, who have been diagnosed with sepsis, leave the ICU, many will not receive the full ‘surround sound’ support that is required to deal with post-sepsis syndrome and other multi-morbidity impacts, including mental health issues.

This has an impact on patients, their families, and carers as well as the healthcare system and wider UK economy. Patients must, therefore, be given the support they need – and deserve – the moment they leave hospital and go back into the community.

RECOMMENDATION

HCPs across primary and community care to be educated on post-sepsis syndrome.

ICU nurses to provide all infection (including sepsis) patients with educational information from patient support groups and charitable organisations, such as the UK Sepsis Trust.

DHSC to urgently conduct feasibility studies into the provision of routine rehabilitation for all patients admitted to hospital with severe infection, including sepsis.



PATIENT STORY

In January 2020, Dave strained his groin muscle while playing football. The following morning, he woke up feeling drained, had flu-like symptoms, and excruciating pain in his leg, which was swollen. He and his wife rushed to their local walk-in centre, where he was diagnosed with a groin injury and given painkillers.

The pain killers didn't help, the pain became unbearable, and Dave was rushed to A&E. He remembers "this pain was something else. I was grey, I couldn't wee, and locked myself in a cubicle in such a confused state."

Dave was suffering from a necrotising fasciitis infection in his left thigh, resulting in sepsis. He was placed in a medically induced coma and taken for immediate surgery to open his leg to try to relieve some pressure and clean out the infection.

His kidneys were failing, so he needed to be put on two dialysis machines. His liver was also showing signs of damage, and his heart rate dropped dangerously low. He also developed an infection in his eye, which has left him with a scarred cornea, meaning he will require a corneal transplant in the future.

Dave needed a further seven operations to try to relieve the pressure in his leg, however tissues were so badly damaged, they began to poison his body. On the 16th of January 2020, Dave's 40th birthday, his family had to make the decision for him to undergo hip disarticulation surgery to remove his entire left leg. He survived the surgery and was discharged from hospital in March.

His recovery began to progress, but he felt wiped out. He'd lost all muscle strength and couldn't breathe by himself. For ten weeks, he was bed bathed, needed a catheter, had tubes in his throat and a tracheostomy, and his hair fell out in chunks.

Dave said "I got better and stronger daily. My dressing came off in July, and I went to the specialist mobility clinic to take the next steps forward using a prosthetic."

Dave started at a local gym, and went swimming, rowing, boxing, and doing weights. Dave said "the boost this gave my mental health was unbelievable. I loved it!".

”
Dave was suffering from a necrotising fasciitis infection in his left thigh, resulting in sepsis.

Case study connected through the UK Sepsis Trust.



AWARENESS AND EDUCATION

Modern medicine continues to deliver beyond the imaginable, be it the development of globally accessible and effective COVID-19 vaccines with robust safety profiles, gene therapies, or artificial intelligence (AI) solutions. Modern medicine continues to allow us to live longer and healthier lives. But modern medicine – in its entirety – is under threat.

Whilst we are seeing global movements to address societal and environmental threats – the imminent threat to modern medicine remains unremarkable to many.

The goal of 'healthcare for all' has the potential to remain beyond the imaginable if we do not work to address our approach to infection management now, and collectively work to elevate the AMR-led issues faced in people's minds across the board – from politicians to healthcare professionals, to the public.

The public – as patients, consumers, and activists – are key to both effecting change and holding others to account. They need to understand their role and be empowered to ask for more of their healthcare providers: to not just "treat me" – but to consciously manage the risks to the patient and the wider population.

Government and society, more broadly, must work to improve education around the role – and, importantly, the value – of antibiotics, vaccines, and diagnostics, at a public level – within schools and through patient engagement within the healthcare setting. The work of BSAC in bridging educational gaps is vast and welcomed; we recommend that these and similar approaches be adopted and embedded manifestly within the UK. All healthcare settings should have access to educational information about the role of antibiotics in everyone's long-term health, equipping healthcare providers to consciously prescribe and address patient expectations.

Sustainable change needs cultural change – we need to work to address this issue across all sectors – from policy to advocacy. The correct legislation can shift public attitude – as was seen with the introduction of the smoking ban, making the wearing of seatbelts a legal requirement, stipulating recycling quotas. Similarly legislation could be introduced to improve our approach to infection management, and the appropriate use of antimicrobials to help shift mindsets and support sustainable and meaningful change.



CASE STUDY

BSAC AS A LEADER IN INFECTION EDUCATION, SURVEILLANCE AND BEST PRACTICE.

Founded in 1971, and with members in 135 countries around the world, BSAC is a global educator, joining the dots between scientific researchers, medical communities and the wider public, encouraging and enabling them to pass on their knowledge to a global audience. BSAC is committed to the patient voice and is developing a patient charter in this regard. Although not exhaustive of its activity, some examples of their valued work in education and infection data gaps are detailed below:

Medical education and stewardship:

- Better education can help prevent disease, develop more effective practice and influence policy. Working together, we can ensure a safer world by developing new drugs, while making sure the ones we already have are used responsibly and protected for future generations
- BSAC's internationally renowned publications are among the foremost international journals in antimicrobial research, while its commitment to scientific excellence is reflected in a varied programme of events, training, and free educational resources
- Summer 2021 saw the launch of a Global Antimicrobial Stewardship Accreditation programme, to allow institutions to build sustainable and robust approaches to infection management

Infection and antimicrobial data gaps:

- The highly innovative UKAR is under development and will provide vital information. This will allow the capture of real world usage of antimicrobial agents and identify where real clinical unmet need lies
- BSAC provides support, advice, and training for susceptibility testing of antimicrobial agents
- BSAC supports the development of services to improve antimicrobial usage and patient outcomes, and advocates for appropriate antimicrobial use through engagement with governments and regulatory bodies worldwide



The COVID-19 pandemic has shone a light on infection threats, both in our day-to-day lives and in hospital settings, and the role of governments and parliamentarians in tackling the issue.

Yet as we know from the experience of living through COVID-19 – we can't predict when or where the next pandemic virus will emerge. But what we do know is that secondary bacterial infections will follow. New antibiotics will be a critical part of our toolkit to fight these superbugs and that is why we must look ahead to the future threat of AMR.

The pandemic has increased awareness of what it may mean to have no vaccine or medicine to tackle an emerging pathogen.

In that respect, it serves as a powerful reminder of what we could face in a world in which antibiotics no longer work. The UK's Special AMR Envoy, Professor Dame Sally Davies has said, the threat of inaction will be potentially catastrophic – with the United Nations (UN) estimating that AMR could kill 10 million people per year worldwide by 2050.

Many key interventions in the control of COVID-19 are also critical in the fight against antibiotic resistance; for example, pushing for patients to be routinely screened for infection, keeping vaccinations up-to-date and conducting tests to determine which class of treatments should be administered to alleviate the infection.

RECOMMENDATIONS

Future government policy to regard infection management in its entirety, by broadening the approach to combatting AMR to include pandemic preparedness, infection prevention and rapid and accurate treatment of time-critical infection. Clarify this approach in amending the Government's next five-year AMR Action Plan to a five-year Infection Management Action Plan.

Unite all stakeholders, via the UK Health Security Agency, in the development of a powerful public awareness campaign – highlighting the importance of appropriate hand hygiene, building on the awareness established as a result of COVID-19.

Education is essential to optimal AMS and should be mandated to ensure the behaviour change necessary to support the recommendations laid out in this White Paper. Local authority education and public health departments to collaborate to encourage education on infection management in local schools.

Learned societies to be recognised by NHSE&I, NICE, HEE and the Wellcome Trust and other similar organisations, as eligible bodies to apply for, or secure, funding for work that addresses and supports the implementation of the recommendations within this White Paper, alongside other already eligible bodies like universities.

Work together to establish the 'human face' of AMR – to elevate the issues faced to a level of public understanding and advocacy equivalent to that seen with other leading causes of death and morbidity such as cardiovascular disease (CVD), cancer and diabetes.



This White Paper sets out a framework for change. To change our strategy on infection management to one which adopts a holistic approach is of the utmost urgency if we are to truly mitigate the harm from infections, from AMR and from future infection outbreaks and pandemics.

CONCLUSION

Dr Ron Daniels,
Founder and Executive Director,
UK Sepsis Trust



To achieve this goal demands that we break down siloes and work collectively across all facets of society to deliver a solution – no longer can we consider pathogen surveillance in isolation from therapies, infection prevention in isolation from AMR, prescribing habits in isolation from diagnostics – any more than we should consider reducing deaths from COVID-19 in isolation from population health and other health conditions.

Central to delivering this change is better data. A strategy against one of mankind's biggest threats which relies (outside of a pandemic) largely upon administrative data to understand patient and healthcare burden, with laboratory data adding colour only for specified pathogens, is outdated. An ambitious and interoperable patient-level data set which collects clinical, demographic and outcome data would allow better understanding of the scale of the problem of infections, of what therapies work and for whom and would, in time, allow not only

better identification and tracking of infection outbreaks but also pave the way toward customised care for all patients with known or presumed infection: the opportunity to redefine at the individual or cohort level which of our patients require urgent antimicrobials (and who might not).

Breaking down barriers between laboratory and clinical diagnosis of infection, with associated positive impact on prescribing, is possible using existing solutions. Facilitated uptake of point-of-care testing, establishing a healthcare ecosystem in which prescribers have rapid access to intelligence around the need for antimicrobials, individualised risk for their patient, and likely sensitivities of any pathogen, will allow clinicians to work hand-in-hand with infection specialists to tailor care rapidly, in the interests of the individual and of responsible prescribing – and to truly bring the phrase 'Start smart, then focus' in the practice of front-line clinicians.



More intelligent diagnosis and management of infections in humans will be but a short-term fix if the pipeline of effective antimicrobials is not improved. It is essential that the subscription pilot for antimicrobials be maintained and expanded to foster an innovative pipeline of new therapeutics, and that this be integrated with diagnostics to ensure that these newly valued agents are delivered judiciously and intelligently to those most in need.

A traditional scientific approach to holistic infection management might stop here. Crucially, a systems approach to infection management recognises that, however strong the public focus on science, as we emerge from the pandemic, just as important are the cultural and societal values and associated behaviour changes that permit transformation. As Prof. Sir Liam Donaldson said, regarding sepsis, in 2017, "*Some very important clinical issues, some of them affecting life and death, stay largely in a backwater which is inhabited by academics and professionals and enthusiasts, dealt with very well at the clinical and scientific level but not visible to the public, political leaders, leaders of healthcare systems...The public and political space is the space in which they need to be in order for things to change.*"²⁰

To this end, together with the clinical and scientific systems improvements, goes awareness, reporting, cultures, and behaviour. Society needs to play its part in infection management. Some aspects – perhaps particularly sepsis – already hold an emotional connection with the UK public. Infection prevention, diagnostics and AMR now need to enter that space. This will be facilitated by confidence in the system – through the availability of highly effective end-to-end care for people with infections, including the provision of rehabilitation support for those with severe infection. Only when we have the whole of society engaged will policy be truly effective in combating this existential threat.





COALITION AUTHORSHIP AND MEMBER STATEMENTS



"The Infection Management Coalition White Paper is an extremely comprehensive document that makes many recommendations on how to tackle AMR at a national, regional, and local level. Achievement of the listed recommendations requires input from multiple stakeholders which the White Paper correctly points out. Our charity has long argued that there needs to be much more joined-up thinking in the UK in tackling AMR. I believe the White Paper should be the start of a UK-wide debate amongst all stakeholders, including affected patients, on how to achieve the many objectives it sets out and is to be very much welcomed."

PROFESSOR COLIN GARNER, CHIEF EXECUTIVE OF ANTIBIOTIC RESEARCH UK

ABHI

"The Association of British HealthTech Industries is the leading health technology (HealthTech) industry association in the UK. Together with our community of 320 members, from small UK businesses to large multi-nationals, we champion the use of safe and effective medical devices, diagnostics and digital health technologies.

ABHI welcomes the formation of the Infection Management Coalition and is committed to work with our partners to bring a more cohesive approach to infection management, a key factor in addressing anti-microbial resistance (AMR). AMR is a global public health crisis and HealthTech has the opportunity to enhance infection prevention measures as well as enable better antimicrobial stewardship through both rapid, accurate diagnostic testing and the appropriate use of therapeutics. We support the recommendations in this White Paper which will help ensure infections are prevented, diagnosed, and effectively treated."

NISHAN SUNTHARES, MANAGING DIRECTOR, DIAGNOSTICS,
ASSOCIATION OF BRITISH HEALTHTECH INDUSTRIES (ABHI)



“Like COVID-19, AMR is an existential threat that needs a coordinated, global response, from stewardship and monitoring of existing antibiotics to a workable solution for funding R&D into new ones. The pharmaceutical industry is committed to working in partnership with like-minded organisations such as UK Sepsis Trust to achieve these goals.

This White Paper offers us a blueprint for further collaboration, building on the commitments that world leaders made at last year’s G7 to put AMR at the top of the global health agenda. We fully support further development of cohesive policy to support meaningful action.”

RICHARD TORBETT, CHIEF EXECUTIVE, THE ASSOCIATION OF THE BRITISH PHARMACEUTICAL INDUSTRY



“BD welcomes a coordinated approach across all stakeholders to deliver a lasting strategy that addresses the prevention, and prompt diagnosis and treatment, for infections across the health system. BD are supportive of a real step-change in the delivery of true population health and the next leap forward in patient safety to enable a smarter, safer NHS, that benefits from informed and digital drivers.”

GREG QUINN, DIRECTOR OF PUBLIC POLICY & ADVOCACY AT BD



“bioMérieux, as a global diagnostic company primarily concerned with infectious diseases, is acutely aware of the need to educate, to prepare, to equip and to empower the world to combat these ever-present threats. We fully endorse collaborative and cross-functional activities to support the NHS and other healthcare systems to better deal with infectious menaces – whether emergent pathogens like SARS-CoV-2, pervasive threats like AMR, or other important hazards. We look forward to collaborative actions to build sustainable systems for bettering the lives of patients, protecting our healthcare workers, and improving global public health.”

MARK MILLER, EXECUTIVE VP AND CHIEF MEDICAL OFFICER AT BIOMÉRIEUX



“BIVDA is delighted to support the Infection Management Coalition. The threat to global health from infectious diseases and AMR is an ongoing battle in which in vitro diagnostics has a significant role to play.”

DORIS-ANN WILLIAMS MBE, CHIEF EXECUTIVE AT BRITISH IN VITRO DIAGNOSTICS ASSOCIATION



“Menarini UK believes that this White Paper coalesces expert opinion on the key areas required to enable better infection management in the UK. We strongly support its recommendations. In particular, given that the investment needed to develop new anti-infectives is significant, we welcome practical solutions on the incentives, reimbursement models and partnerships needed so that we can continue to produce new treatments and diagnostics.

As described in the White Paper, a whole system approach is needed which includes training in the NHS on stewardship and the setting up of robust and transparent monitoring and surveillance processes. Menarini UK will contribute to this by working with others on these shared objectives and standards.”

DR SANTIAGO MARCO-IBANEZ, MEDICAL DIRECTOR &
LEE DURNALL, PUBLIC AFFAIRS MANAGER, MENARINI UK



"The speed and extent to which the COVID-19 pandemic has impacted individuals, families and societies globally, has been both frightening and devastating. We have all had to adapt, respond, and build a new way of life that has affected most, and sadly taken the lives of far too many people.

Pfizer UK is committed to serving patients and the public, not only through the development and manufacture of our breakthrough, lifesaving innovative vaccines and medicines, but also in offering support to Government and the NHS, through our people, knowledge, and expertise, to achieve a holistic and collaborative partnership based on honesty and transparency. We must collectively take the lessons from COVID-19 and 'build back better', including improvements to diagnosis and time for effective interventions to ensure we are armed and ready for future infectious epidemics and pandemics.

No one sector can achieve this single-handedly! This is why Pfizer UK, in collaboration with partners in diagnostic, MedTech and microbiology companies, is committed and delighted to have had the opportunity to input into this White Paper and its recommendations, which aims to align with Government and importantly, truly advocate for a 'One Health' multi-sectoral approach to pandemic and emergency preparedness and infections management."

KYPROS MENICOU, SENIOR POLICY & PUBLIC AFFAIRS MANAGER &
DR TOM ASHFIELD, SENIOR MEDICAL AFFAIRS ADVISOR - ANTIMICROBIAL
RESISTANCE AND STEWARDSHIP, PFIZER HOSPITAL BUSINESS UNIT, PFIZER UK



"Roche is a global pioneer in pharmaceuticals and diagnostics focused on advancing science to improve people's lives. The combined strengths of pharmaceuticals and diagnostics, as well as growing capabilities in the area of data-driven medical insights help us deliver truly personalised healthcare. Roche is working with partners across the healthcare sector to provide the best care for each person.

Together we can shape the future of healthcare, taking learnings from the pandemic to rebuild stronger, together. We are passionate about advancing science – identifying the best innovations, and delivering them to patients. Only by partnering with the brightest minds in science and healthcare, and bodies such as the Infection Management Coalition can we serve patients and the wider healthcare system, both now and in the future. We are delighted to be part of the coalition, to support the White Paper and ignite the debate on antimicrobial resistance."

SHEILA DEVANEY, SENIOR MEDICAL MANAGER, ROCHE DIAGNOSTICS UK



"Thermo Fisher Scientific supports healthcare systems in working 'smarter' by enabling healthcare workers to focus on what truly matters – timely, accurate diagnosis and effective treatment for all patients. Working 'smarter' also means enabling the global community to collaborate more closely in finding solutions to the growing challenges we face from AMR. When this happens, we believe outcomes will improve, aligned with our mission to make the world healthier, cleaner, and safer."

TOBY HAMPSHIRE, SNR. MANAGER, CLINICAL SCIENTIFIC AFFAIRS
& **ROSS STEVENSON**, BUSINESS DEVELOPMENT MANAGER,
THERMO FISHER SCIENTIFIC



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