Antibiotic Resistance: Market Developments, Growth Areas and Opportunities 2014

Description: Threats posed by the global increase in antibiotic resistant bacterial strains continue to cause alarm, and some observers suggest that this problem is threatening to take societies back to a pre-antibiotic era. However, the last five years have seen important changes in practices, innovation and attitudes, in response to this growing threat. Biopharm Reports has recently carried out a global market study of antibiotic resistance, to identify the changing developments and management strategies that are taking place, and the opportunities these offer to developers in this field.

Biopharm Reports has carried out a global market study of antibiotics resistance, to identifying the changes that are taking place in the ‘antibiotic resistance market’ and the opportunities these present to developers in this field. This global study involved the participation of 652 clinicians, scientists, researchers and Government officials in 80 countries and provides a comprehensive overview of current and evolving practices, developments and strategies and their importance in the combating and management of antibiotic resistance.

This report provides a wealth of information for companies and Government departments working in this field, and through a detailed analysis of the study’s findings, identifies commercial opportunities and provides insights, which will help to guide decision-making in this challenging field.

While the emergence of MRSA has embodied concerns over the rise of antibiotic resistance, other trends are becoming increasingly problematic. An example is the emergence of carbapenem resistance in K. pneumonia, due to a lack of alternative treatment options. Reports from the US suggest that 50–60% of all hospital-acquired infections are caused by antibiotic resistant bacteria, illustrating the human and financial impact of antibiotic resistance. In 2009, the World Health Organisation reported that in Europe 25,000 people die every year from drug-resistant infections. In the same year there were 440,000 new cases of MDR tuberculosis, in 69 countries.

Although the use of antibiotics has soared in recent decades, the approval of new antibiotics in the US fell by 60% from 30 during the decade 1983 to 1992, to just 12 over the period 1998 to 2009. Although recent years have seen a significant growth in the numbers and novelty of new pipeline antibiotics, it is evident that the health threats posed by antibiotic resistance need to be tackled urgently, and in many different ways.

The last five years have seen important changes in practices, innovation and attitudes in response to these growing threats. These are driving innovation in drug discovery and diagnostics, but more importantly, in clinical practices and the ways in which antibiotics are being used. There is also increasing local and international surveillance to monitor the emergence and spread of antibiotic resistant strains, and local integrated practices, antimicrobial stewardship programs and more effective diagnostic methods are being pushed forward, in an effort to ensure the most appropriate and effective use of antibiotics. These developments offer new opportunities for developers in this field, both in drug discovery and in diagnostics.

A competitive market analysis of current practices and future developments across 25 key areas relating to antibiotic resistance.

Examples include:

- Diagnostics: Therapeutic areas, top Gram positives, Gram negatives and other pathogens; current and future development of companion diagnostics, tests to distinguish between bacterial and viral infections, the identification of causal bacterial pathogens, bacterial identification methods, preferred tests and instrumentation, preferred suppliers, integrated and antimicrobial stewardship programmes, requirements for innovation, new initiatives and barriers to success.

- Clinical: Therapeutic areas, top infection types, the major Gram positives, Gram negatives and other pathogens; distinguishing bacterial and viral infections, test costs and test times per patient, the identification of causal bacterial, preferred methods and suppliers, the identification of antibiotic resistance genes, integrated and antimicrobial stewardship programmes, requirements for innovation, new initiatives,
barriers to success and future plans in these areas

- Suppliers: Who are the major company suppliers in the ‘antibiotic resistance’ market and who do diagnosticians and clinicians plan to purchase from over the next three years. Who are the top ten suppliers in this field, and what changes are predicted in three years from now.

- Opportunities: The findings of this study are analysed to identify opportunities to suppliers in the ‘antibiotic resistance’ market, in each of the ‘Diagnostics’, ‘Clinical’ and ‘Laboratory’ areas indicated below.

Background

This market study is summarised below:

Market areas

Diagnostics

1. Therapeutic areas: Participants top three (associated) therapeutic areas relating to their work with bacterial diagnostics (general bacterial infections, infections associated with autoimmune disease etc). Options: arthritis, autoimmune diseases, general bacterial infections, bone metabolism, cancer, cardiovascular, central nervous system, dermatology, endocrine, gastrointestinal, genitourinary system, haematology, inflammation, metabolic disorders, musculoskeletal disorders, nutrition, obstetrics and gynaecology, ophthalmology, pain, respiratory, viral infections or other.

2. Main activity: Participants main activity relating to antibiotics and/or antibiotic resistance. Options: The development of bacterial (identification) diagnostic tests; bacterial diagnostic research; differentiating between bacterial infections and viral infections; other.

3. Source of antibiotics: Participants’ disclosures on the main source of antibiotics (those targeting pathogens of interest to them) that relate to their work on bacterial antibiotics. Options: natural, semisynthetic, synthetic or other.


5. Gram positive bacteria: Participants’ disclosures on the top three gram positive bacteria, relating to their work in bacterial diagnostics. Options: Bacillus anthracis, Bacillus cereus, Bacillus subtilis, Clostridium botulinum, Clostridium difficile, Clostridium perfringens, Clostridium tetani, Corynebacterium Diphtheriae, Corynebacterium jeikeium, Enterococcus faecalis, Enterococcus faecium, Enterococcus faecalis, Lactobacillus species, Listeria monocytogenes, Listeria monocytogenes, Staphylococcus aureus, Staphylococcus epidermidis, Staphylococcus saprophyticus, Streptococcus agalactiae, Streptococcus pneumoniae, Streptococcus pyogenes, Streptococcus viridans, other.

6. Other bacteria: Participants’ disclosures on the top three other bacteria, relating to their work in bacterial diagnostics. Options: Options: Gardnerella vaginalis, Mycobacterium leprae, Mycobacterium tuberculosis, Mycobacterium ulcerans, Mycoplasma pneumoniae, Mycoplasma pneumoniae, other.

7. Companion diagnostics: Participants’ disclosures on their work in bacterial diagnostics, relating to the use (or not) of companion diagnostic tests.

8. Companion diagnostics: For those participants who answered ‘yes’ to question 7 – participants description of the companion diagnostic.

9. Bacterial and viral infections: Participants’ disclosures on their development of laboratory tests to distinguish between bacterial and viral infections, prior to antibiotic use. [this refers to tests that are able to distinguish between bacterial and viral infections as a basis for prescribing antibiotics (in cases where a
bacterial infection is confirmed) or not (in cases where a viral infection is confirmed).

10. Future tests for distinguishing bacterial and viral infections: For those participants who answered 'no' to question 10 – participants expectations to in their work three years from now, to research, work on or developing tests to distinguish between bacterial and viral infections, prior to antibiotic use (bacterial infection is confirmed) or not (in cases where a viral infection is confirmed).

11. Identifying causal bacteria: Participants practices on the use of laboratory tests to identify the specific causal bacteria associated with infections, in their work relating to bacterial diagnostics [this refers to tests that are able to identify the specific or major causal bacterium or subtype in a particular patient infection, prior to the clinical selection of an antibiotic to treat that infection].

12. Laboratory identification methods: For those participants who answered 'yes' to question 9 – participants' top three laboratory tests used to identify the specific causal bacteria associated with infections, relating to bacterial diagnostics. Options: microscopic morphological characteristics (e.g. cocci, rods), differential staining (e.g. gram positive, acid fast stain), biochemical tests (e.g. lactose fermentation), serology (e.g. slid agglutination, serological testing), phage typing, fatty acid profiles, flow cytometry (e.g. for pseudomonas, listeria), plasmid fingerprinting, nucleic acid hybridisation, polymerase chain reaction (PCR) microarray or other.

13. Preferred tests and instrumentation: For those participants who answered 'yes' to question 9 – participants' preferred laboratory tests to allow the identification of the specific causal bacteria associated with infections.

14. Preferred suppliers: For those participants who answered 'yes' to question 9 – participants' preferred company suppliers of laboratory tests and instrumentation to allow them to identify the specific causal bacteria associated with infections.

15. Future identification of causal bacterial types: For those participants who answered 'no' to question 9 – participants' anticipated use of laboratory tests three years from now to identify the specific causal bacteria associated with infections [this refers to tests that are able to identify the specific or major causal bacterium or subtype in a particular patient infection, prior to the clinical selection of an antibiotic to treat that infection] Options: yes, possibly, don’t know, probably not, no, other.

16. Future bacterial identification methods: For those participants who answered 'yes' to question 15 – participants' top three laboratory tests three years from now, that they anticipate using to identify the specific causal bacteria associated with infections, prior to antibiotic use. Options: microscopic morphological characteristics (e.g. cocci, rods), differential staining (e.g. gram positive, acid fast stain), biochemical tests (e.g. lactose fermentation), serology (e.g. slid agglutination, serological testing), phage typing, fatty acid profiles, flow cytometry (e.g. for pseudomonas, listeria), plasmid fingerprinting, nucleic acid hybridisation, polymerase chain reaction (pcr) microarray or other.

17. Tests and instrumentation: For those participants who answered 'yes' to question 15 – participants' anticipated preferred laboratory tests, three years from now, to identify the specific causal bacteria associated with infections prior to antibiotic use.

18. Preferred suppliers: For those participants who answered 'yes' to question 15 – participants' anticipated preferred company suppliers, three years from now, of laboratory tests to identify the specific bacteria associated with infections in prior to antibiotic use.

19. Integrated programmes: Participants work with integrated programmes which give access to information on resistant or susceptible bacterial pathogens in their community, prevalent or emerging antibiotic resistance genes or any other 'surveillance-related' information, to support decisions on the use of specific antibiotics. Options: yes/no

20. Current programme: For those participants who answered 'yes' to question 19 – participants disclosures on name of the programme and the geographic area in which it operates.

21. Future integrated programme: For those participants who answered ‘no’ to question 19 – participants disclosures on whether they anticipate working with, in three years from now, any integrated programmes that gives access to information on resistant or susceptible bacterial pathogens in their community, prevalent or emerging antibiotic resistance genes or any other 'surveillance-related' information, to support decisions on the use of specific antibiotics.
22. Name and location: For those participants who answered 'yes' to question 21 – participants disclosures in the name and geographic location of the integrated programme.

23. Antimicrobial stewardship programmes: Participant disclosures on whether their work is associated with an antimicrobial stewardship programme. [Antimicrobial stewardship refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobials - The Infectious Diseases Society of America (IDSA)].

24. Name and location: For those participants who answered 'yes' to question 21 – participants disclosures on the name and geographic location of the antimicrobial stewardship programme.

25. Future antimicrobial stewardship programmes: For those participants who answered 'no' to question 23 – participants anticipated activities in three years from now, on whether their work will be linked to or associated with, an antimicrobial stewardship programme.

26. Name and location: For those participants who answered 'yes' to question 25 – participants disclosures on the name and geographic location of the antimicrobial stewardship programme.

27. Innovation: In their own field, participants' disclosures on what they believe to be the areas of greatest need in terms of innovation or change, to more effectively deal with and manage antibiotic resistance.

28. Barriers: In their own field, participants' disclosures on what they believe are the greatest barriers to more effectively dealing with or managing antibiotic resistance.

29. Initiatives: In their own field, participants' opinions on what new initiatives government departments can promote, to more effectively deal with or manage antibiotic resistance.

Clinical

1. The top three therapeutic areas: relating to participants work with antibiotics or antibiotic resistance (e.g. general bacterial infections, infections associated with autoimmune disease etc). Options: arthritis, autoimmune diseases, general bacterial infections, bone metabolism, cancer, cardiovascular, central nervous system, dermatology, endocrine, gastrointestinal, genitourinary system, haematology, inflammation, metabolic disorders, musculoskeletal disorders, nutrition, obstetrics and gynaecology, ophthalmology, pain, respiratory, viral infections or other.

2. Top three infection types (e.g. lower respiratory tract, urethritis etc): with which clinicians and other participants work.

3. Bacterial and viral infections: Participant's current use of laboratory tests to distinguish between bacterial and viral infections, prior to antibiotic use. [This refers to tests that are able to distinguish between bacterial and viral infections as a basis for prescribing antibiotics (in cases where a bacterial infection is confirmed) or not (in cases where a viral infection is confirmed).

4. Current patients: For those participants who answered 'yes' to question 3, participants estimates of the percentage of (infection) patient cases in which laboratory tests are used to distinguish between bacterial and viral infections, prior to antibiotic use.

5. Preferred distinguishing tests and instrumentation: For those participants who answered 'yes' to question 3 - participants' preferred laboratory tests and instrumentation for distinguishing between bacterial and viral infections, prior to antibiotic use.

6. Suppliers: For those participants who answered 'yes' to question 3 - participants' preferred company suppliers of laboratory tests to allow the distinction between bacterial and viral infections, prior to antibiotic use.

7. Test costs per patient: For those participants who answered 'yes' to question 3 - participants' estimates of average test costs per patient, for distinguishing between bacterial and viral infections, prior to antibiotic use.

8. Test time: For those participants who answered 'yes' to question 3 - participants' estimates of the average test time (from sample taking, to the time results are available) for distinguishing between bacterial
infections and viral infections, prior to antibiotic use.

9. Future distinction between bacterial and viral infections: For those participants who answered ‘no’ to question 3 – participants expectation of using laboratory tests three years from now to distinguish between bacterial and viral infections, prior to antibiotic use. (This question refers to tests that are able to distinguish between bacterial and viral infections as a basis for prescribing antibiotics (in cases where a bacterial infection is confirmed) or not (in cases where a viral infection is confirmed).

10. Future patients: For those participants who answered ‘yes’ to question 9 – participants estimate of the percentage of (infection) patient cases in which laboratory tests three years from now, to distinguish between bacterial and viral infections, prior to antibiotic use.

11. Future tests and instrumentation: For those participants who answered ‘yes’ to question 9 – participants (anticipated) preferred laboratory tests and instrumentation three years from now, for distinguishing between bacterial and viral infections, prior to antibiotic use.

12. Future preferred suppliers: For those participants who answered ‘yes’ to question 9 – participants (anticipated) preferred company suppliers three years from now, of laboratory tests to allow them to distinguish between bacterial and viral infections, prior to antibiotic use.

13. Identifying causal bacteria: Participants practices on the use of laboratory tests to identify the specific causal bacteria associated with infections, prior to antibiotic use. (This refers to tests that are able to identify the specific or major causal bacterium or subtype in a particular patient infection, prior to the clinical selection of an antibiotic to treat that infection).

14. Current patients: For those participants who answered ‘yes’ to question 13 – participants’ estimates of the current percentage (%) of (infection) patient cases in which they use laboratory tests to identify the specific causal bacteria associated with infections, prior to antibiotic use.

15. Laboratory identification methods: For those participants who answered ‘yes’ to question 13 – participants’ top three laboratory tests used to identify the specific causal bacteria associated with infections, prior to antibiotic use: Options: microscopic morphological characteristics (e.g. cocci, rods), differential staining (e.g. gram positive, acid fast stain), biochemical tests (e.g. lactose fermentation), serology (e.g. sid agglutination, serological testing), phage typing, fatty acid profiles, flow cytometry (e.g. for pseudomonas, listeria), plasmid fingerprinting, nucleic acid hybridisation, polymerase chain reaction (PCR) microarray or other.

16. Preferred tests and instrumentation: For those participants who answered ‘yes’ to question 13 – participants’ preferred laboratory tests to allow the identification of the specific causal bacteria associated with infections, prior to antibiotic use.

17. Preferred suppliers: For those participants who answered ‘yes’ to question 13 – participants’ preferred company suppliers of laboratory tests and instrumentation to allow you to identify the specific causal bacteria associated with infections, prior to antibiotic use.

18. Test costs per patient: For those participants who answered ‘yes’ to question 13 – participants’ estimates of the average test costs per patient, to identify the specific causal bacteria associated with infections, prior to antibiotic use.

19. Test time: For those participants who answered ‘yes’ to question 13 – participants’ estimates of the average test time (from sample taking, to the time results are available) to identify the specific causal bacteria associated with infections, prior to antibiotic use.

20. Future identification of causal bacterial types: For those participants who answered ‘no’ to question 13 – participants’ anticipated use of laboratory tests three years from now to identify the specific causal bacteria associated with infections, prior to antibiotic use. (This refers to tests that are able to identify the specific or major causal bacterium or subtype in a particular patient infection, prior to the clinical selection of an antibiotic to treat that infection).

21. Future patients: For those participants who answered ‘yes’ to question 20 – participants’ estimates of the percentage (%) of their (infection) patient cases three years from now, in which they expect to use laboratory tests to identify the specific causal bacteria associated with infections prior to antibiotic use.
22. Future bacterial identification methods: For those participants who answered ‘yes’ to question 20 – participants’ top three laboratory tests three years from now, that they anticipate using to identify the specific causal bacteria associated with infections, prior to antibiotic use. Options: microscopic morphological characteristics (e.g. cocci, rods), differential staining (e.g. gram positive, acid fast stain), biochemical tests (e.g. lactose fermentation), serology (e.g. slid agglutination, serological testing), phage typing, fatty acid profiles, flow cytometry (e.g. for pseudomonas, listeria), plasmid fingerprinting, nucleic acid hybridisation, polymerase chain reaction (PCR) microarray or other.

23. Tests and instrumentation: For those participants who answered ‘yes’ to question 20 – participants’ anticipated preferred laboratory tests three years from now, to identify the specific bacteria associated with infections prior to antibiotic use.

24. Preferred suppliers: For those participants who answered ‘yes’ to question 20 – participants’ anticipated preferred company suppliers three years from now, of laboratory tests to identify the specific bacteria associated with infections prior to antibiotic use.

25. Antibiotic resistance genes: Participants’ current use laboratory tests to identify antibiotic resistance genes in patient samples, prior to antibiotic use.

26. Current patients: For those participants who answered ‘yes’ to question 25 – participants’ estimates of the current percentage (%) of (infection) patient cases in which they use laboratory tests to identify antibiotic resistance genes in patient samples, prior to antibiotic use.

27. Preferred tests and instrumentation: For those participants who answered ‘yes’ to question 25 – participants’ preferred laboratory tests to identify antibiotic resistance genes in patient samples, prior to antibiotic use.

28. Preferred suppliers: For those participants who answered ‘yes’ to question 25 – participants’ preferred company suppliers of laboratory tests to identify antibiotic resistance genes in patient samples, prior to antibiotic use.

29. Testing costs: For those participants who answered ‘yes’ to question 25 – participants’ estimates of the average test costs per patient, for identifying antibiotic resistance genes in patient samples, prior to antibiotic use.

30. Test time: For those participants who answered ‘yes’ to question 25 – participants’ estimates of the average test time (from sample taking, to the time results are available) for identifying antibiotic resistance genes in patient samples, prior to antibiotic use.

31. Future identification of resistance genes: For those participants who answered ‘no’ to question 25 – participant’s anticipated use of laboratory tests three years from now, to identify antibiotic resistance genes in patient samples, prior to antibiotic use.

32. Future patients: For those participants who answered ‘yes’ to question 31 – participants’ estimates of the percentage (%) of their (infection) patient cases three years from now, in which they expect to identify antibiotic resistance genes in patient samples, prior to antibiotic use.

33. Antibiotic resistance gene tests and instrumentation: For those participants who answered ‘yes’ to question 31 – participants’ anticipated preferred laboratory tests and instrumentation three years from now, for identifying antibiotic resistance genes in patient samples, prior to antibiotic use.

34. Future suppliers: For those participants who answered ‘yes’ to question 31 – participants anticipated preferred company suppliers three years from now, of laboratory tests to allow them to identify antibiotic resistance genes in patient samples, prior to antibiotic use.

35. Integrated programmes: Participants work with integrated programmes which give access to information on resistant or susceptible bacterial pathogens in their community, prevalent or emerging antibiotic resistance genes or any other ‘surveillance-related’ information, to support decisions on the use of specific antibiotics. Options: yes/no

36 Current programme: For those participants who answered ‘yes’ to question 35 – participants disclosures on name of the programme and the geographic area in which it operates.
37. Future integrated programme: For those participants who answered ‘no’ to question 35 – participants disclosures on whether they anticipate working with, in three years from now, any integrated programmes that gives access to information on resistant or susceptible bacterial pathogens in your community, prevalent or emerging antibiotic resistance genes or any other 'surveillance-related' information, to support decisions on the use of specific antibiotics.

38. Name and location: For those participants who answered ‘yes’ to question 37 – participants disclosures in the name and geographic location of the integrated programme.

39. Antimicrobial stewardship programmes: Participant disclosures on whether their work is associated with an antimicrobial stewardship programme. [**antimicrobial stewardship refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobials - The Infectious Diseases Society of America (IDSA)].

40. Name and location: For those participants who answered ‘yes’ to question 39 – participants disclosures on the name and geographic location of the antimicrobial stewardship programme.

41. Future antimicrobial stewardship programmes: For those participants who answered ‘no’ to question 39 – participants anticipated activities in three years from now, on whether their work will be linked to or associated with, an antimicrobial stewardship programme.

42. Name and location: For those participants who answered ‘yes’ to question 41 – participants disclosures on the name and geographic location of the antimicrobial stewardship programme.

43. Gram negative bacteria: Participants’ disclosures on the top three gram negative bacteria (where their identities are known or strongly suspected) that are associated with the infections treated in hospitals or clinics. Options: Acinetobacter species, Actinobacillus species, Bacteroides fragilis, Bacteroides sp., Bordetella pertussis, Borrelia burgdorferi, Brucella abortus, Brucella canis, Brucella melitensis, Brucella suis, Campylobacter jejuni, Chlamydia pneumoniae, Chlamydia trachomatis, Chlamydophila pneumoniae, Chlamydomphila psittaci, Chlymidia pneumoniae, Cyanobacteria, Enterobacter, Erwinia species, Escherichia coli, Francisella tularensis, Fusobacterium nucleatum, Haemophilus influenzae, Helicobacter pylori, Klebsiella pneumoniae, Legionella pneumophila, Leptospira interrogans, Moraxella catarrhalis, Neisseria gonorrhoeae, Neisseria meningitidis, Pasteurella multocida, Proteus bacilli, Pseudomonas aeruginosa, Rickettsia rickettsii, Salmonella typhimurium, Serratia marcescens, Shigella sonnei, Treponema pallidum, Vibrio cholerae, Yersinia pestis or other.

44. Gram positive bacteria: Participants’ disclosures on the top three gram positive bacteria (where their identities are known or strongly suspected) that are associated with the infections treated in hospitals or clinics. Options: Bacillus anthracis, Bacillus cereus, Bacillus subtilis, Clostridium botulinum, Clostridium difficile, Clostridium perfringens, Clostridium tetani, Corynebacterium Diphtheriae, Corynebacterium jeikeium, Enterococcos faecalis, Enterococcus faecium, Enterococcus fecalis, Lactobacillus species, Listeria monocytogenes, Listeria monocytogenes, Staphylococcus aureus, Staphylococcus epidermidis, Staphylococcus saprophyticus, Streptococcus agalactiae, Streptococcus pneumoniae, Streptococcus pyogenes, Streptococcus viridans, other.

45. Other bacteria: Participants’ disclosures on the top three other bacteria please (where their identities are known or strongly suspected) that are associated with the infections treated in hospitals or clinics. Options: Gardnerella vaginalis, Mycobacterium leprae, Mycobacterium tuberculosis, Mycobacterium ulcerans, Mycoplasma pneumoniae, Mycoplasma pneumoniae, other.

46. Antibiotics against Gram negative bacteria: Participants’ disclosures on the top three antibiotic classes that are most commonly prescribed to treat gram negative bacteria, in hospitals or clinics. Options: aminocyclitols, aminoglycosides, carbapenems, cephalosporins, monobactams, penicillins, cyclic lipopeptides, folate antagonists, fluoroquinolones, glycopeptides, immunomodulators, ketolides, lincosamides, macrocyclics, macrolides, mycobacterials, nitrofurans, oxazolidinones, peptides, pleuromutilins, polyptides, pyridopyrimidines, quinolones, streptogramins, sulphonamides, tetracycline, other.

47. Antibiotics against Gram positive bacteria: Participants’ disclosures on the top three antibiotic classes that are most commonly prescribed to treat gram positive bacteria, in hospitals or clinics. Options: aminocyclitols, aminoglycosides, carbapenems, cephalosporins, monobactams, penicillins, cyclic lipopeptides, folate antagonists, fluoroquinolones, glycopeptides, immunomodulators, ketolides, lincosamides, macrocyclics, macrolides, mycobacterials, nitrofurans, oxazolidinones, peptides, other.
pleuromutilins, polypeptides, pyridopyrimidines, quinolones, streptogramins, sulphonamides, tetracycline, other.

48. Antibiotics against other bacteria: Participants' disclosures on the top three antibiotic classes that are most commonly prescribed to treat other bacteria, in hospitals or clinics. Options: aminocyclitols, aminoglycosides, carbapenems, cephalosporins, monobactams, penicillins, cyclic lipopeptides, folate antagonists, fluoroquinolones, glycopeptides, immunomodulators, ketolides, lincosamides, macrocyclics, macrolides, mycobacterials, nitrofurans, oxazolidinones, peptides, pleuromutilins, polypeptides, pyridopyrimidines, quinolones, streptogramins, sulphonamides, tetracycline, other.

49. Treatment costs: Participants' disclosures on the average costs for antibiotics per patient, to treat bacterial infections in their hospital or clinic.

50. Single antibiotics or combinations: Participants disclosures on the percentage (%) of their patients who are treated with one, two, three or more than three antibiotics at the same time (enhancers such as lactamase inhibitors are not included). Options: one antibiotic, two antibiotics together, three antibiotics together, more than three antibiotics, other.

Innovation: In their own field, participants' disclosures on what they believe to be the areas of greatest need in terms of innovation or change, to more effectively deal with and manage antibiotic resistance.

51. Barriers: In their own field, participants' disclosures on what they believe are the greatest barriers to more effectively dealing with or managing antibiotic resistance.

52. Initiatives: In their own field, participants opinions on what new initiatives government departments can promote, to more effectively deal with or manage antibiotic resistance.

Laboratory

1. Main purpose of participant's research work: Options: clinical research, routine diagnostics, diagnostics research, clinical trials, patient treatment, disease research, drug research or other.

2. Top three (associated) therapeutic areas: relating to participants work with antibiotics or antibiotic resistance (e.g. general bacterial infections, infections associated with autoimmune disease etc). Options: arthritis, autoimmune diseases, general bacterial infections, bone metabolism, cancer, cardiovascular, central nervous system, dermatology, endocrine, gastrointestinal, genitourinary system, haematology, inflammation, metabolic disorders, musculoskeletal disorders, nutrition, obstetrics and gynaecology, ophthalmology, pain, respiratory, viral infections or other.

3. Main activity: Participants disclosures relating to antibiotics and/or antibiotic resistance. Options: research to identify naturally occurring antibiotics; research to identify semisynthetic, antibiotics, research to identify synthetic antibiotics, new mechanistic strategies to combat antibiotic resistance, new bacterial drug targets, new diagnostics for identifying bacterial types, genetic studies of resistance genes, or the resistome, other.

4. Antibiotic source: Participants disclosures on the main source of the antibiotics on which they are working. Options: natural, semisynthetic, synthetic, other.

5. Gram negative bacteria: Participants' disclosures on the top three gram negative bacteria, with which they are working. Options: Acinetobacter species, Actinobacillus species, Bacteroides fragilis, Bacteroides sp., Bordetella pertussis, Borrelia burgdorferi, Brucella abortus, Brucella canis, Brucella melitensis, Brucella suis, Campylobacter jejuni, Chlamydia pneumoniae, Chlamydia trachomatis, Chlamydophila pneumoniae, Chlamyphila psittaci, Chlamydia pneumoniae, Cytobacterium, Enterobacter, Erwinia species, Escherichia coli, Francisella tularensis, Fusobacterium nucleatum, Haemophilus influenzae, Helicobacter pylori, Klebsiella pneumoniae, Legionella pneumophila, Leptospira interrogans, Moraxella catarrhalis, Neisseria gonorrhoeae, Neisseria meningitidis, Pasteurella multocida, Proteus bacilli, Pseudomonas aeruginosa, Rickettsia rickettsii, Salmonella typhimurium, Serratia marcessens, Shigella sonnei, Treponema pallidum, Vibrio cholerae, Yersinia pestis or other.

6. Gram positive bacteria: Participants' disclosures on the top three gram positive bacteria, with which they are working. Options: Bacillus anthracis, Bacillus cereus, Bacillus subtilis, Clostridium botulinum, Clostridium difficile, Clostridium perfringens, Clostridium tetani, Corynebacterium Diptheriae, Corynebacterium jeikeium, Enterococcus faecalis, Enterococcus faecium, Enterococcus faecalis, Lactobacillus species, Listeria monocytogenes, Listeria monocytogenes, Staphylococcus aureus, Staphylococcus epidermidis,
Staphylococcus saprophyticus, Streptococcus agalactiae, Streptococcus pneumoniae, Streptococcus pyogenes, Streptococcus viridans, other.

7. Other bacteria: Participants’ disclosures on the top three other bacteria, with which they are working: Options: Gardnerella vaginalis, Mycobacterium leprae, Mycobacterium tuberculosis, Mycobacterium ulcerans, Mycoplasma pneumoniae, Mycoplasma pneumoniae, other

8. Companion diagnostics: Participants’ disclosures on their work with antibiotics and/or antibiotic resistance, relating to the use (or not) of companion diagnostic tests. Options: Yes or no.

9. Companion diagnostics: For those participants who answered ‘yes’ to question 8 – participant’s description of the companion diagnostic

10. Identification methods: Participants’ disclosures on the use of bacterial identification methods in their work relating to antibiotics and/or antibiotic resistance. (This refers to tests that are able to identify the specific or major causal bacterium or subtype, prior to the development of antibiotics to target the associated pathogen(s).

11. Methods: For those participants who answered ‘yes’ to question 10 – participants top three laboratory tests used to identify the specific causal bacteria associated with their work related to antibiotic resistance. Options: microscopic morphological characteristics (e.g. cocci, rods), differential staining (e.g. gram positive, acid fast stain), biochemical tests (e.g. lactose fermentation), serology (e.g. slid agglutination, serological testing), phage typing, fatty acid profiles, flow cytometry (e.g. for pseudomonas, listeria), plasmid fingerprinting, nucleic acid hybridisation, polymerase chain reaction (PCR) microarray or other.

12. Preferred Products: For those participants who answered ‘yes’ to question 10 – participants disclosures on their preferred products for the identification of bacterial pathogens.

13. Preferred supplier: For those participants who answered ‘yes’ to question 10 – participants disclosures on their preferred supplier companies for products used for the identification of bacterial pathogens.

14. Future identification methods: For those participants who answered ‘no’ to question 10 – participants disclosures on their anticipated use of bacterial identification methods three years from now, in their work relating to antibiotics and/or antibiotic resistance.

15. Future methods: For those participants who answered ‘yes’ to question 14 - participants anticipated use of bacterial identification methods three years from now, relating to their work on antibiotics and/or antibiotic resistance. Options: microscopic morphological characteristics (e.g. cocci, rods), differential staining (e.g. gram positive, acid fast stain), biochemical tests (e.g. lactose fermentation), serology (e.g. slid agglutination, serological testing), phage typing, fatty acid profiles, flow cytometry (e.g. for pseudomonas, listeria), plasmid fingerprinting, nucleic acid hybridisation, polymerase chain reaction (PCR) microarray or other.

16. Preferred tests and instrumentation: For those participants who answered ‘yes’ to question 14 - participants’ anticipated preferred laboratory tests and instrumentation three years from now, for identifying bacterial pathogens.

17. Future suppliers: For those participants who answered ‘yes’ to question 14 – participants anticipated preferred company suppliers three years from now, of laboratory tests for identifying bacterial pathogens.

18. Antibiotics against Gram negative bacteria: Participants’ disclosures on the top three antibiotic classes that are used against gram negative bacteria, in their work on antibiotics or antibiotic resistance. Options: aminocyclitols, aminoglycosides, carbapenems, cephalosporins, monobactams, penicillins, cyclic lipopeptides, folate antagonists, fluoroquinolones, glycopeptides, immunomodulators, ketolides, lincosamides, macrocyclics, macrolides, mycobacterials, nitrofurans, oxazolidinones, peptides, pleuromutilins, polypeptides, pyridopyrimidines, quinolones, streptogramins, sulphonamides, tetracycline, other.

19. Antibiotics against Gram positive bacteria: Participants’ disclosures on the top three antibiotic classes that are used against gram positive bacteria, in their work on antibiotics or antibiotic resistance. Options: aminocyclitols, aminoglycosides, carbapenems, cephalosporins, monobactams, penicillins, cyclic lipopeptides, folate antagonists, fluoroquinolones, glycopeptides, immunomodulators, ketolides, lincosamides, macrocyclics, macrolides, mycobacterials, nitrofurans, oxazolidinones, peptides,
pleuromutilins, polypeptides, pyridopyrimidines, quinolones, streptogramins, sulphonamides, tetracycline, other.

20. Antibiotics against other bacteria: Participants' disclosures on the top three antibiotic classes that are used other bacteria, in their work on antibiotics or antibiotic resistance. Options: aminocyclitols, aminoglycosides, carbapenems, cephalosporins, monobactams, penicillins, cyclic lipopeptides, folate antagonists, fluoroquinolones, glycopeptides, immunomodulators, ketolides, lincosamides, macrocyclins, macrolides, mycobacterials, nitrofurans, oxazolidinones, peptides, pleuromutilins, polypeptides, pyridopyrimidines, quinolones, streptogramins, sulphonamides, tetracycline, other.

21. Novel combinations: Participants disclosures on the use of novel combinations of antibiotics or antibiotic enhancers (e.g. lactamases).

22. Combinations: For those participants who answered 'yes' to question x – participants', disclosures on the research into novel combinations.

23. Single antibiotics or combinations: Participants disclosures on the percentage (%) of their developments that relate to one, two, three or more than three antibiotics at the same time (enhancers such as lactamase inhibitors are not included). Options1: one antibiotic, two antibiotics together, three antibiotics together, more than three antibiotics, other.

24. Integrated programmes: Participants disclosures on their work with integrated programmes that give access to information on resistant or susceptible bacterial pathogens in their community, prevalent or emerging antibiotic resistance genes or any other 'surveillance-related' information, to support decisions on the use of specific antibiotics.

25. Current programme: For those participants who answered 'yes' to question 24 – participants disclosures on name of the programme and the geographic area in which it operates.

26. Future integrated programme: For those participants who answered ‘no’ to question 24 – participants disclosures on whether they anticipate working with, in three years from now, any integrated programmes that gives access to information on resistant or susceptible bacterial pathogens in your community, prevalent or emerging antibiotic resistance genes or any other 'surveillance-related' information, to support decisions on the use of specific antibiotics.

27. Name and location: For those participants who answered ‘yes’ to question 26 – participants disclosures in the name and geographic location of the integrated programme.

28. Antimicrobial stewardship programmes: Participant disclosures on whether their work is associated with an antimicrobial stewardship programme [antimicrobial stewardship refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobials - The Infectious Diseases Society of America (IDSA)].

29. Name and location: For those participants who answered 'yes' to question 28 – participants disclosures on the name and geographic location of the antimicrobial stewardship programme.

30 Future antimicrobial stewardship programmes: For those participants who answered ‘no’ to question 28 – participants anticipated activities in three years from now, on whether their work will be linked to or associated with, an antimicrobial stewardship programme.

31. Name and location: For those participants who answered ‘yes’ to question 30 – participants disclosures on the name and geographic location of the antimicrobial stewardship programme.

32. Innovation: In their own field, participants' disclosures on what they believe to be the areas of greatest need in terms of innovation or change, to more effectively deal with and manage antibiotic resistance.

33. Barriers: In their own field, participants' disclosures on what they believe are the greatest barriers to more effectively dealing with or managing antibiotic resistance.

34. Initiatives: In their own field, participants opinions on what new initiatives government departments can promote, to more effectively deal with or manage antibiotic resistance.
2.17 Barriers
2.18 Initiatives

3. Laboratory
3.1 Purpose
3.2 Top three therapeutic areas
3.3 Antibiotic source
3.4 Gram negative bacteria
3.5 Gram positive bacteria
3.6 Other bacteria
3.7 Companion diagnostics
3.8 Current Identification methods
3.8.1 Preferred current products and suppliers
3.9 Future identification methods
3.9.1 Preferred products and supplier
3.10 Antibiotics against Gram negative bacteria
3.11 Antibiotics against Gram positive bacteria
3.12 Antibiotics against other bacteria
3.13 Novel antibiotic combinations
3.14 Single antibiotics or combinations
3.15 Integrated programmes
3.15.1 Current programmes
3.15.2 Names and locations
3.15.3 Future programmes
3.15.4 Names and locations
3.16 Current programme
3.17 Future integrated programme
3.18 Name and location
3.19 Antimicrobial stewardship programmes
3.19.1 Current programmes
3.19.2 Names and locations
3.19.3 Future programmes
3.19.4 Names and locations
3.20 Innovation
3.21 Barriers
3.22 Initiatives

4. Diagnostics
4.1 Therapeutic areas
4.2 Source of antibiotics
4.3 Gram negative bacteria
4.4 Gram positive bacteria
4.5 Other bacteria
4.6 Companion diagnostics
4.7 Bacterial and viral infections
4.8 Future tests for distinguishing bacterial and viral infections
4.9 Identifying causal bacteria
4.10 Laboratory identification methods
4.10.1 Preferred products and suppliers
4.11 Future identification of causal bacterial types
4.11.1 Preferred products and suppliers
4.12 Integrated programmes
4.12.1 Current programmes
4.12.2 Names and locations
4.12.3 Future programmes
4.12.4 Names and locations
4.13 Antimicrobial stewardship programmes
4.13.1 Current programmes
4.13.2 Names and locations
4.13.3 Future programmes
4.13.4 Names and locations
4.14 Innovation
4.15 Barriers
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