An evaluation of the antimicrobial resistance surveillance system in England, 2013 - 2014

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INTRODUCTION

- Antimicrobial resistance (AMR) is a growing public health problem of global concern
- In England the Department of Health published its Five Year AMR Strategy (2013 – 2018) with the aim: "improve the knowledge and understanding of AMR"
- PHE priority to support the AMR strategy through effective surveillance and better access to and use of surveillance data

Aim: Evaluate the national AMR surveillance system between 2013–2014

Objectives: a) describe the surveillance system including its purpose, system architecture and reporting arrangements, b) assess the system attributes: flexibility, simplicity, timeliness, completeness, data quality, acceptability

AMR Surveillance in England: AmSurv

- AmSurv was first developed in 2002 and rolled out across nine regions in England in 2009
- Aim: To provide readily accessible surveillance information on antimicrobial resistance in definable patient populations for users at local and regional levels
- Automated electronic reporting of antimicrobial susceptibility test (AST) records for all bacterial isolates tested in all NHS & PHE microbiology laboratories in England

METHODS

- Based on the Centres for Disease Control (CDC) guidelines for evaluating public health surveillance systems
- Data Source: all AST records submitted by NHS & PHE laboratories in England between 01 January 2013 and 31 December 2014 to AmSurv database
- Survey of stakeholders using a semi-structured online questionnaire: users within PHE, NHS laboratories and hospitals
- Simplicity & Flexibility: Review of existing system protocols and operational manuals and stakeholder survey results
- Timeliness: Days between specimen date and import into system
- Data Quality: %completeness of data fields : patient ID, NHS number, date of birth, sex, postcode, speciality, zone size and minimum inhibitory concentration (MIC)
- Completeness: % of specimens matched on NHS numbers between
  - MRSA bacteraemia submitted to AmSurv and the national mandatory HCAI Data Capture system.
  - all bacteraemia submitted to AmSurv and those submitted to with an AST record to CoSurv (laboratory system for reporting notifiable organisms)
- Acceptability: % of laboratories reporting and stakeholder survey results

RESULTS

Number of records

Between 2013 and 2014, 40,332,074 AST records were submitted to AmSurv relating to 4,335,207 clinical specimens (Figure 1).

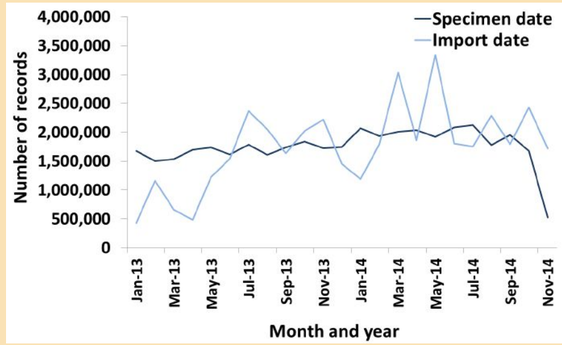

Figure 1: Number of AmSurv records by import and specimen date, January 2013 to November 2014, England.

Simplicity

- Simple architecture that utilises routinely collected data extracted directly from laboratory information systems. Reporting is integrated with existing reporting mechanisms for notifiable organisms
- 50% of users agreed or strongly agreed that AmSurv was simple to use

Flexibility

- Individual laboratory systems required adaptions to enable production of AmSurv files. Cost and resource implications.
- Unable to add additional data fields with out reconfiguration of all output files and laboratory system software
- 22.9% of survey respondents agreeing or strongly agreeing that AmSurv was flexible/adaptable

Timeliness

- Median of 21 days (IQR = 9 – 48 days), range = 0 - 494 days from specimen date to upload to AmSurv (Figure 2)

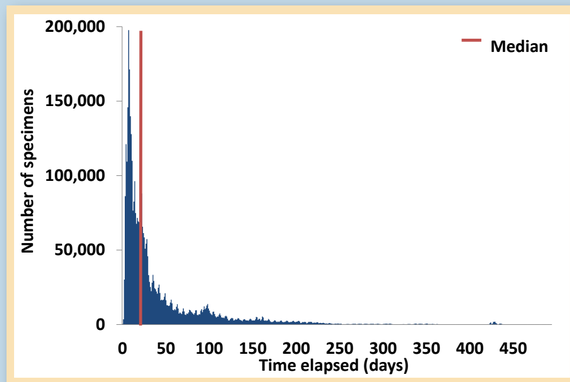

Figure 2: Time elapsed (days) between the specimen date and the upload date into AmSurv, 2013-2014, England.

Data Quality

- Completeness of AST records was above 90% for date of birth (99.7%), sex (99.6%), patient postcode (94.1%), NHS number (92.3%) and patient ID (92.3%), and above 80% for speciality (80.6%). "Zone size" and "MIC" were low at 1% and 14%, respectively (Figure 3).

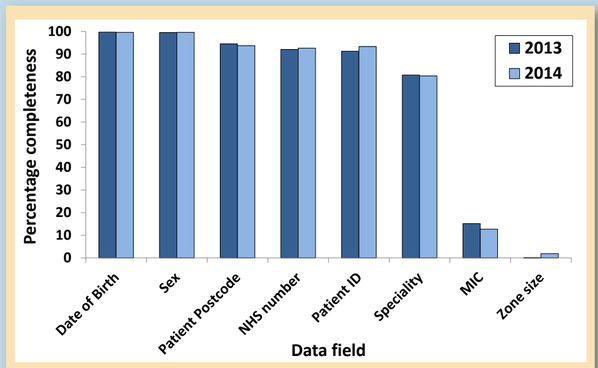

Figure 3: Percentage completeness of AmSurv records data fields, 2013 and 2014, England

Completeness

- 57% of the 153,123 bacteraemia specimens in Cosurv were matched to bacteraemia specimens in AmSurv
- 45% of the 1,591 MRSA bacteraemia in the HCAI Data Capture System were matched to MRSA bacteraemia in AmSurv

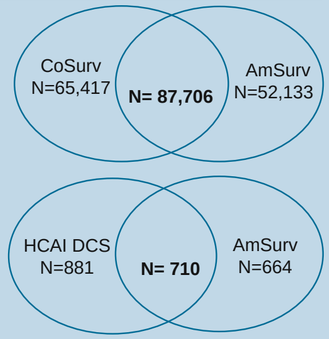

Figure 4: Venn diagrams of specimens matched between a) CoSurv and AmSurv and b) HCAI Data Capture System (DCS) and AmSurv, 2013-2014.

Acceptability

- At the end of 2013, 65.7% of laboratories (90/139) were reporting. This increased to 89.6% (120 /134) by the beginning of 2015
- Stakeholder survey response rate: 17.1% (n=88)
- 70% of respondents agreed or strongly agreed the AmSurv system was useful for AMR surveillance
- Main involvement in system was producing data files for upload (60%). Only 30% queried the data and 15.3% analysed AmSurv
- Stakeholders reported difficulties in accessing and interpreting data
- AMR data was used for information only (46.2%) and monitoring trends in the local area (35.4%). Small proportion used the information informed specific public health action

DISCUSSION

- This was the first evaluation of the AmSurv system since it was implemented in 2009.
- The system has enabled the collection and collation of over 40 million AST records in England. It was found to be simple but inflexible due to difficulties in adapting to laboratory systems.
- The system was not timely as specimens results took a median of three weeks to be uploaded. The only timeliness markers available were 'Specimen Date' and 'Import Date' so it is unknown where the delay occurs.
- Data quality of patient demographics was good allowing accurate description of characteristics of persons infected/colonised with AMR organisms. However, completeness of the data fields "MIC" and "zone size" was very low.
- Completeness of the AmSurv system was low at 57% and 45% when compared to two other databases that contained AST data and likely to reflect low coverage of laboratories during 2013.
- The system was acceptable with up to 90% coverage of English laboratories but the main use by stakeholders was in reporting of AST data from laboratories. Information was mainly used for health statistics and was rarely used to inform local action
- Limitations: matching for completeness was done on direct matches of NHS number only which maybe an underestimate. Responder bias in the stakeholder survey is possible towards those with an interest in AMR.

CONCLUSIONS

- Overall the AmSurv system has been successful in collating AST results for England.
- However, the system only partially met the objective of providing readily accessible surveillance information to local and regional users.

RECOMMENDATIONS

- Improvements in completeness, timeliness and data quality are required to ensure the system accurately describes the burden of disease and highlights emerging issues in a timely manner through:
  - improved coverage of NHS laboratories in England with routine daily reporting
  - monitoring data quality of the minimum dataset
  - improve collation of methodologies used for susceptibility testing and increase data completeness of "MIC" and "zone size" data fields to aid interpretation of data
- Ensuring that interpretable AMR information is accessible and being used for public health action should now be a priority for PHE.

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