



D-2.6:

Report on

Status on

***“OH Knowledge Base –
Integration”***

JIP1 - ORION - IA1 - 1st Call

Responsible Partner: DTU



GENERAL INFORMATION

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2019 Status report on OH Knowledge Base – Integration

Enhancing cross-sector, integrated surveillance

The work in WP2 integration in 2019 continued to build on the work from 2018. A catalogue of examples of implemented integrated surveillance initiatives was published in March 2019¹ *Inspiration and ideas - One health integration in surveillance* [One Health Integration in Surveillance](#). The objective of the study was to inspire others to improve their surveillance by further integration. One of the hurdles to changing current practices is often that people cannot imagine how things could be done differently causing low levels of belief in self-efficacy. The catalogue offers a variety of examples along the whole surveillance pathway that illustrates that integration is possible and describes ways to overcome practical problem such as data sharing, governance and integrated outcome communication in surveillance. For further information see the [Deliverable ORION WP2 D2.3 + appendix](#) on <https://onehealthjep.eu/groups/orion/>

During the first half of 2019, opportunities for additional integration in the Danish surveillance systems were identified and formed the base of the three ORION pilot studies. The requirements were discussed across the sectors of animal health, food safety and public health, including several actors such as poultry industry, government officials and academia.

Initially, a need to better integrate the interpretation of AMR data in *Campylobacter* and *Salmonella* was identified. Good collaboration was already in place, but the level of integrated data interpretation and the One Health perspective could be improved. A pilot study was designed to develop a template to interpret and report integrated AMR and AMU surveillance data for foodborne zoonoses across animal health, food safety and public health to a One Health objective. DANMAP 2018 and 2019 was using for the pilot studies (Pilot 1).

Secondly, *Campylobacter* surveillance in Denmark is very comprehensive and is conducted at multiple points in the food chain with different purposes and objectives. The outputs from the individual surveillance components are used for a specific surveillance or control purpose only and not analysed further and no integration between data-streams is applied today. To address this, a pilot study was designed to explore the additional value of integration of multiple *Campylobacter* surveillance data streams from industry and government data in animals and food (Pilot 2).

Thirdly, discussions of improvements to the whole *Campylobacter* surveillance system from farm-to-patient was hampered by the lack of overview of what components existed in other sectors. To counteract this, a pilot was developed to describe the Danish *Campylobacter* system from farm-to-patient in one framework (Pilot 3).

All pilot project descriptions are also available via this link: [onehealthjep -ORION Pilot WP2-](#)

¹ Ellis-Iversen, J., Petersen, C. K., & Helwich, B. (2019). *Inspiration and ideas - One health integration in surveillance*. Kgs. Lyngby: Technical University of Denmark. Link : [One Health Integration in Surveillance](#)

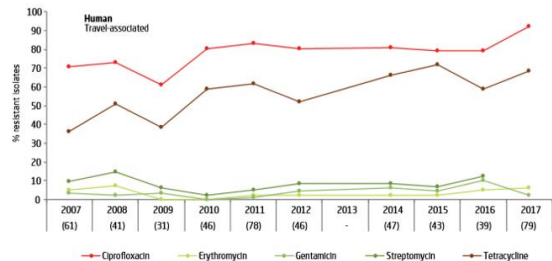
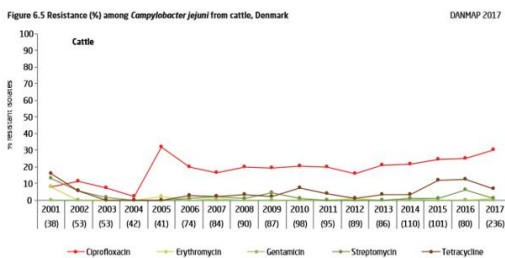
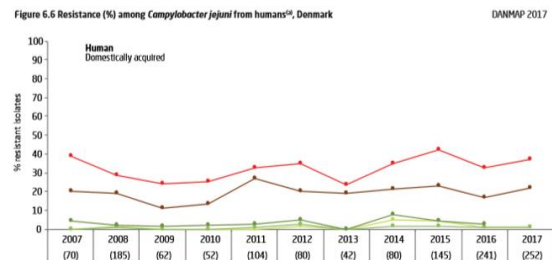
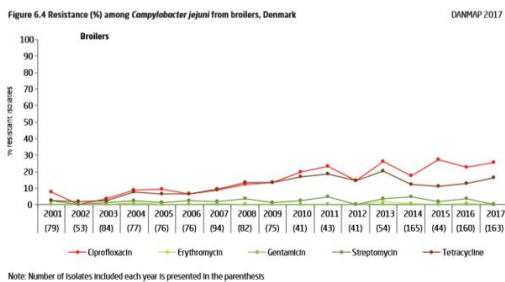


Status on pilot projects in WP2 integration

Pilot 1 : Enhancing the One Health-ness of interpretation of AMR and AMU surveillance data for zoonoses.

The work has progressed in 2019 and the section on resistance on campylobacter has been improved by integrating the three relevant data streams of AMU for treatment in humans, AMR in animals and food and AMR in people.

The previous years, the report has always contained data on resistance in Campylobacter of human, animal and meat origin. Traditionally, the section had subheading such as resistance in isolates from chicken and chicken meat, isolates for cattle and isolates from humans. Each subsection was written by the sector author after cross-sectorial discussions and interpretations and had figures showing levels of AMR to all drugs by species. Figure 1 shows an example of the figures in pre-2018 reports.



A new integrated format was discussed using the stepping stone question: 'why does AMR in Campylobacter matter?' and arriving at the answer: 'because it may cause treatment failure in humans'. The authors from both sectors had a meeting to discuss how to interpret the data to communicate the outcomes to reflect this OH perspective. This resulted in new sector integrated sections:

Introduction

For this section, the antimicrobials relevant for treatment of human Campylobacteriosis were investigated and described. The investigation started by consulting the national treatment



guidelines² and experts to support the written instructions. The guidelines identified macrolides or ciprofloxacin as the drug of choice for treatment-required campylobacteriosis or undiagnosed diarrhea requiring treatment. Examination of the surveillance data on use of antimicrobials further identified ciprofloxacin as prescribed for diarrhea.

Resistance to Erythromycin and Ciprofloxacin

The data was interpreted in an OH context and a figure presented that showed the trends in Erythromycin resistance in the last 5 years for chicken, cattle, domestically acquired human case and travel associated human cases. The chapter was published in DANMAP 2018³ [DANMAP link](#)

Figure 6.3 Ciprofloxacin resistance (%) among *Campylobacter jejuni* from broilers, cattle and human cases, Denmark

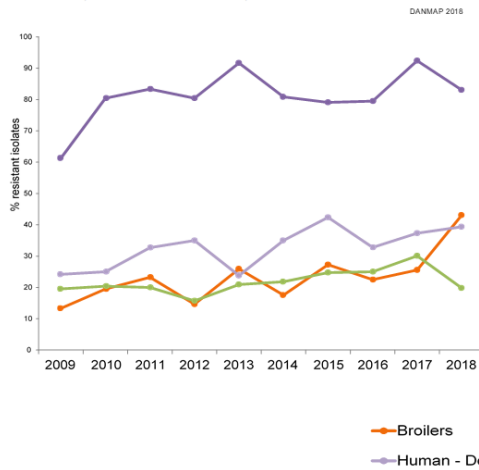
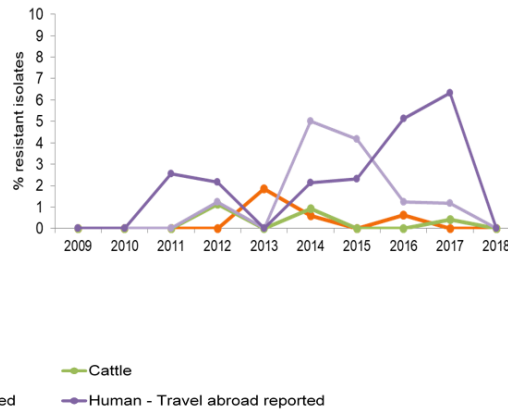


Figure 6.1 Erythromycin resistance (%) among *Campylobacter jejuni* from broilers, cattle and human cases, Denmark



The work on integrating the Salmonella section has commenced with a multisector meeting, identifying the One Health relevant angles and deciding on subheadings and analysis for the 2019 data. The full One Health chapter will be published in DANMAP 2019 in Q3 of 2020.

Expected ORION outputs:

The outcome will be presented as “A template for interpreting integrated AMU and AMR data on food borne zoonoses” and will be added to the ORION knowledge hub.

Expected external Impacts:

Improving the general understanding of the importance of AMR in zoonoses to all stakeholders facilitating an appropriate control response.

Expected internal impacts:

Better collaboration between SSI and DTU authors and enhanced motivation to explore and utilise the data and knowledge to provide integrated surveillance outputs.

² <https://pro.medicin.dk/Laegemiddelgrupper/Grupper/318140>

³ Borck Hoeg et al, (2019) DANMAP 2018 - Use of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from food animals, food and humans in Denmark, Chapter 6., *Campylobacter*: [DANMAP 2018](#)



Pilot 2.

Explore the additional value of integration of multiple Campylobacter surveillance data streams from animal health and food safety

This objective is integrating surveillance data and register data from 3-4 surveillance components across animal health and food safety for Campylobacter in Denmark. The aim is to enhance the surveillance value by looking at the whole farm-to-fork-to-human exposure chain by carrying out integrated analyses and cross-sector interpretation. Data from 2013-2018 was received from industry and government, which were combined with surveillance data sets available at DTU. The data was cleaned and harmonized using R-programme files and outliers and missing values were identified and discussed with data owners. The data and metadata was described and the analyst acquired an indepth understanding of the surveillance components and the data.

Towards the end of the 2019, the data was further collated with the national CHR database to allow for geo-referencing and identification of production type of the flocks at the time of sampling. In 2020, analytical objectives will be identified and the data analysed across data-streams and sectors to add value to the traditional sector specific surveillance.

Expected ORION outputs:

An assessment of the surveillance value of enhancing data integration in Campylobacter surveillance in Denmark and 1-2 drafts for peer reviewed publication.

Expected external Impacts:

Contribute to the surveillance and control of Campylobacter in Denmark

Expected internal impacts:

Improved collaboration between food safety and poultry industry, academia, govenment and industry

Pilot 3.

A coherent description of a surveillance system from farm-to-patient was developed and is being prepared for publication.

A template for description of each component was developed and modified to encompass animal, food and human surveillance data. Processes along the surveillance chain were described including target populations, sampling methods, laboratory methods, data analyses and stakeholders. Descriptive results of the different components will be presented along side the detailed data and metadata descriptions. The work continues into 2020.

Expected ORION outcomes :

Description of the Danish Campylobacter surveillance system with a proposed template to describe surveillance systems from farm-to-patient. Tried framework for describing systems from farm-to-patient. Draft for peer-reviewed publication.



Expected internal impacts:

Improved cross-sector understanding of the full surveillance system

Integration of work within ORION

We continued to seek integration opportunities between work packages and provide fora and opportunity to do so. We supported the design and integration of individual pilots by identification of opportunities for collaboration and integrating the knowledge from experts within ORION. Since our pilots are on data integration, we have had several meetings with WP3 on data integration and data information sharing to mutual benefit for both WPs.

In June, WP2 integration chaired a workshop to identify expected outcomes and performance indicators for all pilots and share objectives and sub-objectives. This highlighted further opportunities for collaboration and integration within especially the ORION Codex. A plan for sharing pilot designs internally and externally was made and an evaluation matrix was planned. The knowledge sharing and added value from the enhanced collaborations between institutes will contribute to improve the OH knowledge hub as well as support MS with implementation of further OH approaches in surveillance. Another cross-pilot workshop is planned for January 2020.

Each ORION pilot project was described in the template and the descriptions were published <https://onehealth.ejp.eu/groups/orion-knowledge-hub/documents/>

WP2 integration pilot study 1 – Integrating data and interpretation - DK

Background

Aim

Objectives

Task	Tasks	Expected outputs / outcomes	Schedule	OHS Codex principle	Evaluation

Evaluation matrix [matrix](#)

Steps in the surveillance pathway	Levels of integration			

Picture 1. Template to describe ORION pilot projects

To ensure harmonisation across all pilots in ORION and the ability to objectively evaluate OH progress, an ORION evaluation matrix was developed. It consists of rows representing the steps in the surveillance pathway extended with additional specified rows on ORIONs main foci. This means that the ‘data collation’ ‘data analysis and interpretation’ were divided in to several rows with different foci – e.g. collaboration or data integration. The columns stated increasing levels of cross-sector integration and collaboration. Each pilot study filled in a table stating what stage they were at before the pilot and what stage was expected after execution of the pilot study.



Table 1: Example of an evaluation table for an ORION pilot project

Steps in the ORION surveillance pathway	Levels of integration			
	Level 1	Level 2	Level 3	Level 4
Design, adjustment and optimisation	Undertaken separately in each sector	Undertaken by a single sector for all surveillance components	Cross-sectoral consultation but undertaken separately in each sector	Undertaken by a cross-sectoral working group for OH objectives
Sample/data collection	Undertaken separately in each sector	Undertaken by a single sector for OH objectives	Harmonisation across sectors	Joint activities across sectors
Laboratory analysis	Undertaken separately in each sector	Undertaken by a single sector for OH objectives	Harmonisation of methods across sectors	Joint activities across sectors
Data transfer /sharing	No data exchange	Notification of unusual events only or when needed	Data exchange at regular intervals (e.g. yearly)	Ongoing data exchange; joint database and/or open access
Data interoperability	Unstructured data	Internal harmonisation (organization own coding practices)	Structural interoperability* across sectors	Semantic interoperability* across sectors
Data analysis/interpretation – COLLABORATION	Undertaken separately in each sector	Undertaken separately and collated by a single sector	Undertaken separately and then combined by a cross-sectoral working group	Jointly undertaken by multi-sectoral working groups
Data analysis/interpretation – DATA STREAMS	Interpretation of each data stream individually in each individual sector to sector specific objectives	Interpretation of multiple, sector specific data streams in each sector to sector specific objectives	Interpretation of multiple data streams from multiple sectors to sector specific objectives with cross-sector consultation	Interpretation to joint cross-sector objectives of multiple data streams from multiple sectors
Outcome communication	Undertaken separately in each sector	Joint dissemination in separate sectoral activities	Joint dissemination by a single sector	Joint cross-sectoral dissemination
Prioritization and response	undertaken separately in each sector	undertaken by a single sector for all surveillance components	cross-sectoral consultation but undertaken separately in each sector	undertaken by a cross-sectoral working group

WP2 integration meetings and outreach

Internal meetings within each pilot study are ongoing and the work package is always represented in the internal ORION meetings. A meeting is planned in January 2020 between pilot projects that are describing surveillance systems from farm-to patient to discuss approaches to discuss and align methodology for this.

Two meetings were held between WP2 integration and WP3 to discuss data flow, integration and terminology and identify synergies and align terminology.

A workshop was held in June 2019 to discuss and align pilots as well as improve the understanding of how they fit into the overarching ORION objectives. A second workshop for this purpose is organised for January 2020 in Copenhagen.

External meetings

- WP2 integration also participated in a COHESIVE workshop to discuss the application of the “A Tripartite Guide to Addressing Zoonotic Diseases in Countries » for a European setting and will continue involvement in this work. April 11th, 2019
- WP2 integration participated in Webex meeting: COHESIVE Task 2.2 Risk Assessment decision-making tool on September 6th, 2019
- WP2 integration participated in teleconference on VC COHESIVE Guidelines task 2.1 on July 17th/19th, 2019



Presentations and knowledge-sharing

The work integrated interpretation of AMR in zoonoses from pilot 1 is often used in our external DANMAP presentations. In 2019, it has been included as an example of enhancing integrated surveillance in presentations for:

- DANMAP Seminar. November 2019
- SCAR animal health and welfare collaborative working group, October 2019.
- Visit from Hong Kong Public Health, Food Safety and Animal Health, November 2019
- Flemming Fund fellows from Nigeria, November 2019
- Nordic zoonoses meeting with representatives from AH, FS and PH from all Nordic Countries, September 2019
- Discussed and presented at several meetings with the Danish Veterinary and Food Administration throughout the year

Other presentations/publications

ORION Knowledge Hub webinar on December 6th, 2019

Ellis-Iversen, J., Petersen, C. K., & Helwich, B. (2019). Inspiration and ideas - One health integration in surveillance. Kgs. Lyngby: Technical University of Denmark. Link : [One Health Integration in Surveillance](#)

Borck Hoeg et al, DANMAP 2018 - Use of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from food animals, food and humans in Denmark, *Chapter 6., Campylobacter* : [DANMAP 2018](#)

Dorea, F., Ellis-Iversen, J., Boone, I., Gethmann, J., Lagesen, K., & Filter, M. (2018). ORION - one health surveillance initiative on harmonization of data collection and interpretation. Poster session presented at SVEPM 2018, Tallinn, Estonia.