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Canadian Integrated Program for Antimicrobial Resistance Surveillance
Programme intégré canadien de surveillance de la résistance aux antimicrobiens

Antimicrobial Resistance Across the Food Chain - An Update from CIPARS 2005

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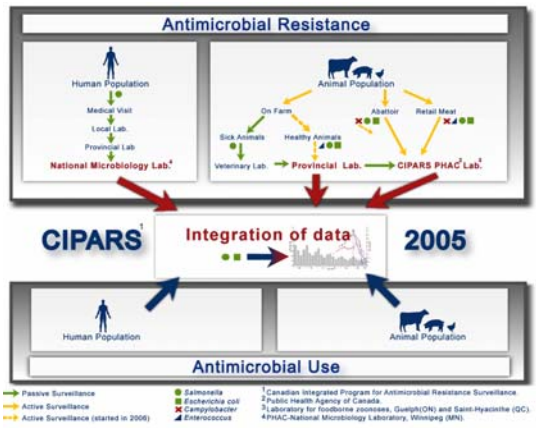
Introduction

The Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) is a national antimicrobial resistance / antimicrobial use surveillance program initiated in 2002 and dedicated to the collection, integration, analysis and communication of timely, ongoing and representative information derived from animals, foods, humans and the environment (Figure 1). The 2005 CIPARS report summarizes data regarding: clinical isolates of human and animal *Salmonella* ; abattoir isolates of *Salmonella* and commensal *Escherichia coli* ; retail meat isolates of *Salmonella*, *E. coli, Campylobacter*, and *Enterococcus*; and human antimicrobial use.

Figure 1. CIPARS: The Canadian Integrated Surveillance Program for Antimicrobial Surveillance



Method

CIPARS 2005
Human Surveillance

Enhanced Passive Surveillance of Human Clinical Isolates
- National since January 2003
-Active participation of the Canadian Public Health Laboratory Network.
- *Salmonella* only

Drug use monitoring
-IMS (Intercontinental Medical Statistics Health**)** data extracted and analyzed since 2000
-Community drug use (Compuscript Audit)

Agri-food Surveillance

Active Abattoir Surveillance
-National since September 2002
-Generic *Escherichia coli* from beef cattle, chicken and swine, and *Salmonella* from chicken and swine from the caecal content at slaughter

Active Retail Surveillance

-Provinces of Ontario and Quebec since summer 2003, Saskatchewan added in 2005
-Generic *E. coli*, *Salmonella*, *Campylobacter spp.*, and *Enterococcus spp.* from chicken and *E. coli* from beef and pork meat purchased in groceries and butcher stores.
-No surveillance of *Salmonella* and *Campylobacter* in beef and pork due to prevalence below 3% in retail meat

Passive surveillance of Animal Clinical Isolates

- *Salmonella* from animal specimens collected from laboratories across Canada since 2002.

Figure 2. Isolation rates in abattoir caecal and retail meat samples

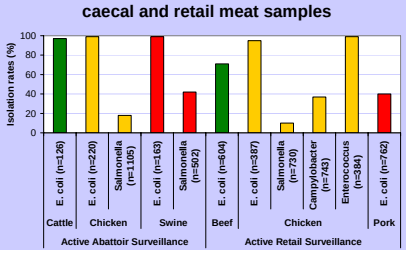


Figure 3. Percentage of isolates resistant to one or more antimicrobial

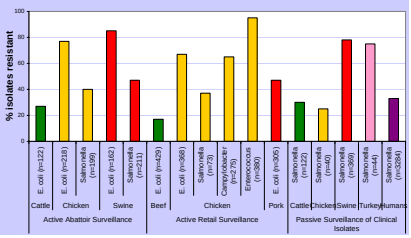


Figure 4. Resistance to nalidixic acid, ceftiofur and amoxicillin-clavulanic acid in *E. coli* and *Salmonella* abattoir and retail samples

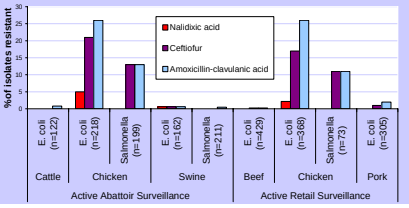
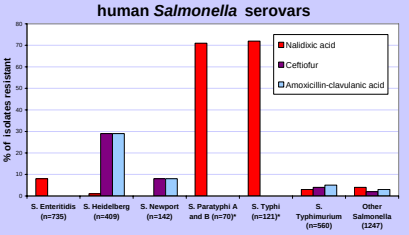


Figure 5. Resistance in nalidixic acid, ceftiofur and amoxicillin-clavulanic acid among the most frequent human *Salmonella* serovars



* *S. Paratyphi A and B (non Java) and S. Typhi do not have an agrifood reservoir*

Results – Key findings

-Decrease in % recovery of Salmonella in chicken from retail meat from 2003-2004 (16%) to 2005 (10%)

-Chicken meat *Campylobacter* % recovery also dropped from 47% in 2004 to 37% in 2005.

-Antimicrobial resistance is widespread among isolates of agri-food origin (Figure 3).

Results – Key findings

-Nalidixic acid resistance is less frequent in agri-food (figure 4) than human clinical isolates (Figure 5), especially in S. Paratyphi A and B and S. Typhi.

-Resistance to ciprofloxacin observed in 3% of chicken Campylobacter and in less than one percent of the chicken Enterococcus isolates in 2005.

-In 2004, ceftiofur resistance in chicken *Salmonella* isolates was 22% at the abattoir level and 40% at the retail level (retail surveillance in Ontario and Quebec only).

-Resistance to ceftiofur in more frequent in *S*. Heidelberg than in other human serovars (Figure 5).

Discussion

- The drop in *Salmonella* and *Campylobacter* prevalence among retail chicken samples is not a result of adding Saskatchewan into retail surveillance in 2005 or of a change in isolation methods but likely the effect of food processing changes.

-Resistance to nalidixic acid in human *Salmonella* isolates is most likely linked to the increasing use of fluoroquinolones in humans around the world, including in Canada (CIPARS 2004 report). S. Typhi and Paratyphi A and B (non Java) only have a human reservoir and fluoroquinolones are not extensively used by the agri-food sector in Canada (personal communications). Enrofloxacin has only been recently approved with a very restricted label by the Veterinary Drug Directorate for the treatment of cattle respiratory problems.

- Resistance to ceftiofur, a drug used only in animals, is associated with decreased susceptibility of ceftriaxone, an important drug in the treatment of invasive salmonellosis in children. CIPARS 2003 report highlighted a possible link between ceftiofur resistance in chicken and human *S*. Heidelberg. Following this publication, Quebec hatcheries voluntary stopped the use of ceftiofur in eggs in February 2005. This could explain the lower levels of resistance detected in chicken *Salmonella* in 2005. Data from 2006 year of surveillance are needed to ascertain the impact of the reduction of ceftiofur resistance in chicken *S.* Heidelberg on human *S*. Heidelberg resistance level.

CIPARS still evolving

-***Active On-farm Surveillance*** introduced in 2006 in swine farms across Canada
-***Active Abattoir Surveillance :*** Addition of *Campylobacter* recovery in cattle facilitates the surveillance of fluoroquinolone resistance after approval of enrofloxacin in cattle
-***Active Retail Surveillance :*** Addition of British Columbia (November 2006) and the Atlantic provinces (March 2007).
-On going laboratory characterization and epidemiologic research

Acknowledgements

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References

Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS), 2004 Annual Report, and 2005 preliminary report available online: http://www.phac-aspc.gc.ca/cipars-picra

...pour préserver l'efficacité des antimicrobiens pour l'homme et l'animal

...working towards the preservation of effective antimicrobials in humans and animals