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References


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**Enrofloxacin in Poultry and Human Health**

To the Editor: Following logic similar to that recently used by the US Food and Drug Administration to withdraw approval for enrofloxacin, a recent letter estimated that fluoroquinolone use in poultry could compromise responses to antimicrobial drugs in >24,000 persons per year in the United States (1). However, >99.9% of this estimated risk appears to result from incorrect assumptions. Potentially important corrections include the following: 1) not attributing resistance from foreign travel and human ciprofloxacin use to domestic use of enrofloxacin in poultry (this could reduce the estimated risk by \(\approx 1/3\) (2); 2) updating the estimated fraction of human foodborne Campylobacter infections caused by poultry to reflect declines in microbial loads on chicken carcasses since 1992 reduces the estimated risk by a factor of perhaps 1/10 (3) (the cited 90% estimate by Hurd et al. [7] was intended for use as part of a conservative upper-bounding analysis, not as a realistic point estimate); 3) replacing an assumption that 10% of infected persons would benefit from antimicrobial drug treatment with a more data-based value of 0.6% (4) would reduce the estimated risk by a factor of 0.6/10 = 0.06; 4) replacing an assumption that fluoroquinolones are prescribed for all affected patients receiving antimicrobial drug treatment (rather than, for example, erythromycin) by a more realistic value of fluoroquinolones being prescribed for perhaps \(\approx50\%\) of patients (2) reduces the estimated risk by a factor of \(\approx50\%\); 5) replacing an assumption that all such cases lead to compromised responses with a more data-driven estimate that perhaps \(\approx17\%\) of patients have compromised responses would reduce the estimated risk by a factor of 1/6 (5); and 6) recognizing that reducing enrofloxacin use may not decrease fluoroquinolone resistance in all *Campylobacter* spp. from food animals (effect not quantified) (6). Together, such changes reduce the estimated risk by a factor of at least \((1/3) \times (1/10) \times (0.6/10) \times (1/2) \times (1/6) = 0.00017\), or by \(>99.9\%\).

More notably, the calculation in (1) also wrongly assumes that the fraction of patients with fluoroquinolone-resistant infections times the fraction of infections caused by poultry gives the fraction of patients with compromised response caused by fluoroquinolone use in poultry. As a simple counterexample, suppose that 80% of all infections were caused by poultry, with the rest caused by something else (e.g., water), and that all and only the 20% of infections caused by the latter source are resistant. Then the procedure in (1) would estimate (80% of infections caused by poultry) \(\times\) (20% of infections resistant) = 16% as the fraction of resistant infections caused by poultry, even though the correct answer is zero. Thus, the basic logic of the calculation is flawed.

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References

Cox also misquotes Busby et al. (3) when he asserts that only 0.6% of persons with *Campylobacter* infections benefit from antimicrobial drugs. The Busby article states that 0.6% of persons with *Campylobacter* infections need “hospitalization,” not how many would benefit from antimicrobial drug therapy. Cox has thus made a misleading attribution (something he has previously been found to do [5]).

Busby et al. (3) estimated that in 1993, ≈1,500,000 persons in the United States acquired *Campylobacter* infections from food sources. Even if the proportion who can benefit from receiving antimicrobial drugs is as low as 2%, this translates to 30,000 persons. If 20% of these infections were caused by fluoroquinolone-resistant *Campylobacter* spp., then 6,000 persons would potentially have their therapy and outcome compromised, rather than the 1 person that Cox would have us believe. More realistic is the figure of 24,000 persons estimated previously to be at risk of having an adverse outcome (or ≈285 persons for every 1 million chickens treated with fluoroquinolones) (1). Cox’s assumptions and calculations thus seem flawed and unrealistic.

Peter Collignon*

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References


In response: Cox’s letter (1) contains a number of false assumptions, errors, misleading assertions, and misquotations. Cox asserts that annually 1 person or fewer in the United States will experience an adverse outcome from receiving antimicrobial drugs. The Busby article states that 0.6% of persons with *Campylobacter* infections need hospitalization, not how many would benefit from antimicrobial drug therapy. Cox has thus made a misleading attribution (something he has previously been found to do [5]).

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