One Health, One World –
anew approach to infectious disease threats?

Lyn Gilbert, University of Sydney

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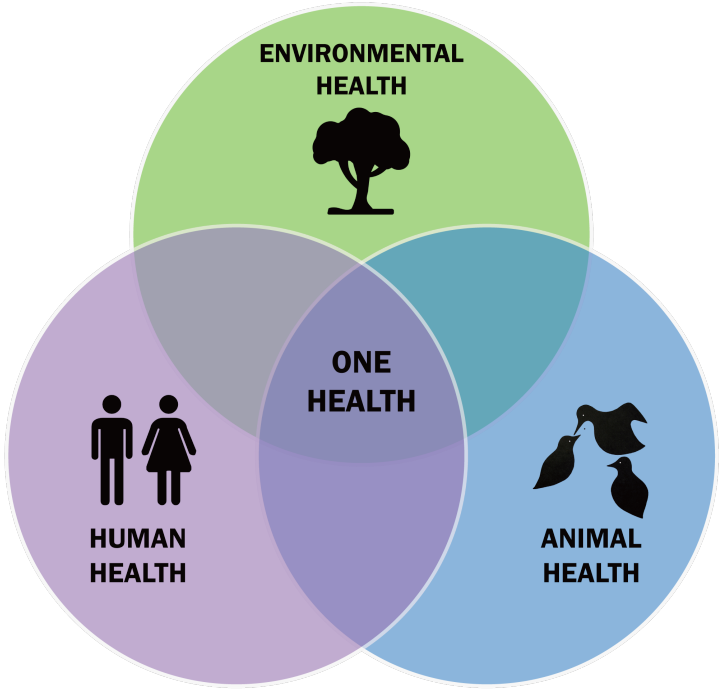
No conflicts to declare

One Health

…. recognises that:

- human, animal and environmental health are interdependent,
- animal species provide a shared reservoir for pathogen exchange and spread,
- many EIDs are driven by human-animal interactions

Origins & evolution of One Health



One Health concept - not new

- Hippocrates 'bad air' = pestilence
- Ancient healers – treated humans and animals

19th century - Rudolf Virchow, pathologist - zoonoses

20th century - 1960 – 'One Medicine'

- Combined med/vet approach to zoonoses

21st century 2003 – SARS

- '… *unknown virus can emerge from wildlife without warning*'

2004 - **'One Health'** Wildlife Society Symposium

- Animal diseases threaten human health, food security, economy

2003-5 global organisations WHO, FAO, WOAH

- Silos: - need for cooperation & collaboration

Emerging/re-emerging infectious diseases (EIDs)

Stable/enzootic infection ➡

stress ➡ epizootic(s) ➡

spillover ➡ **new locations/populations**

➡ genetic variation

Control measures can affect:

livelihoods, food security, trade, economies, politics

Stresses: ecological, socioeconomic, political

changing land use, live animal trade, intensive animal husbandry

Severe Acute Respiratory Syndrome – anatomy of an EID

Human cases

- November 2002 Guangzhou, China; March 2003 Hong Kong
- Global spread 33 countries - SARS-CoV identified
- July 2003 - rapid control; >8000 confirmed cases; 774 deaths

Source(s)

- Early cases – clustered near markets esp. animal handlers
- SARS-CoV isolated from several market animals exp. civets
- Intermediate hosts – not reservoir

Reservoir

- Horseshoe bats: reservoir for many viruses
- Bats, bat products in food and traditional medicine markets
- High seroprevalence/wide distribution of seropositive bats

Bovine Spongiform Encephalopathy

'Mad cow disease' - first cases: UK1986

- 'bovine scrapie' = BSE
- 1970s - bovine meat-and-bone meal fed to cattle – 'cannibals'
- 1988 - feed bans; slaughter of affected cattle - poor compliance
  - 1992-4: 4.4 million cattle slaughtered
  - ~500,000 infected cattle entered food chain

Government message: "beef is safe" .....

BUT

- BSE-like disease in cats; experimentally transmitted to rodents

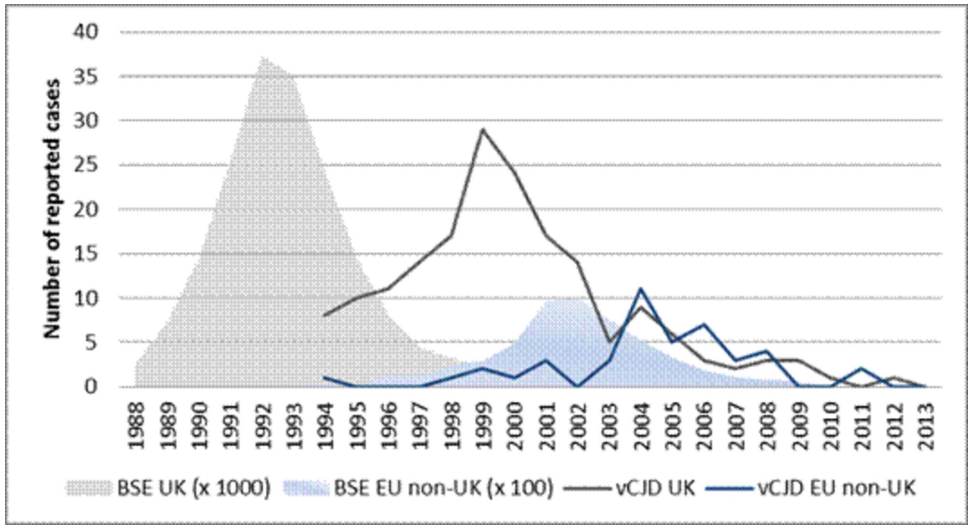
1994-5 - Creutzfeldt Jacob disease in young people (vCJD)

Variant Creutzfeldt Jacob Disease

1996 vCJD - linked to beef consumption

- EU banned British beef; industry decimated
- "…the link between BSE and vCJD …'*unleashed the most damaging science-based political crisis that has ever occurred in Britain'..*" *

- Estimated cost US$11 billion - loss of trade, tourism, blood products; rural communities devastated
- By 2021: 232 vCJD cases globally
  - 4000 carriers



*Forbes, I. (2004). Making a Crisis Out of a Drama: The Political Analysis of BSE Policy-Making in the UK. *Political Studies*, *52*(2), 342-357. https://doi.org/10.1111/j.1467-9248.2004.00483

Highly pathogenic avian influenza A(H5N1)

- 1994-7: H5N1 - in geese, China/Hong Kong
  - High mortality in affected flocks - culled
  - ? Controlled
- 2003-5: more outbreaks
  - spread by wild birds to Asia, Africa, Middle East, Europe
  - few recognised human cases – bird contact (?50-60% mortality)
  - massive culling of poultry – industrial & small backyard flocks
    - **loss of protein source & livelihood; disincentive to report**

EID control – challenges*

Global agencies involved in disease control - competing

WHO, FAO, WOAH – different frames:

- ***Technical/biomedical*** *(WHO/FAO)*: virology, elimination, pharmaceuticals
- ***Societal intervention*** *(FAO/WOAH)*: human behaviours & cultures
- ***Ecology/conservation*** *(WOAH)*: wildlife protection; sustainability

One World One Health: combined, holistic approach

- 1st International One Health conference, Melbourne 2011
- Commitment to interagency collaboration (in theory)

*Chien Y-J, How did international agencies perceive the avian influenza problem? The adoption and manufacture of the 'One World, One Health' framework. Sociology of Health & Illness 2012. *doi: 10.1111/j.1467-9566.2012.01534.*

Highly pathogenic avian influenza A(H5N1)

- 2012-23 – more poultry outbreaks; more wild birds affected
  - **Mammals & more countries** involved
  - increased **genetic variation** H5N1 clades & H5 subtypes
  - few human cases (bird contact) - **no human-human** spread
  - 2022: **131million domestic poultry killed** in 67countries
- WHO, FAO, WOAH collaboration (in practice)
  - Collaborative surveillance, genomics, research
  - Farm biosecurity, rapid detection & reporting, ?vaccination

Have we learnt enough from COVID-19?

The Standard, July 2023

Why experts are worried after two new human cases are confirmed in Britain

Pet owners are being urged to keep cats indoors and dogs on a leash after two poultry workers became the fourth and fifth Brits to become infected with bird flu this week — so how worried should we be about the virus? Katie Strick reports

AVIAN FLU IS CAPABLE OF CROSSING OVER TO HUMANS

Reuters, March 2023

Health

Vaccine makers prep bird flu shot for humans 'just in case' as rich nations lock in supplies

Scientists raise concerns over potential vaccine hoarding should a human outbreak occur

Thomson Reuters · Posted: Mar 20, 2023 12:03 PM EDT | Last Updated: March 21

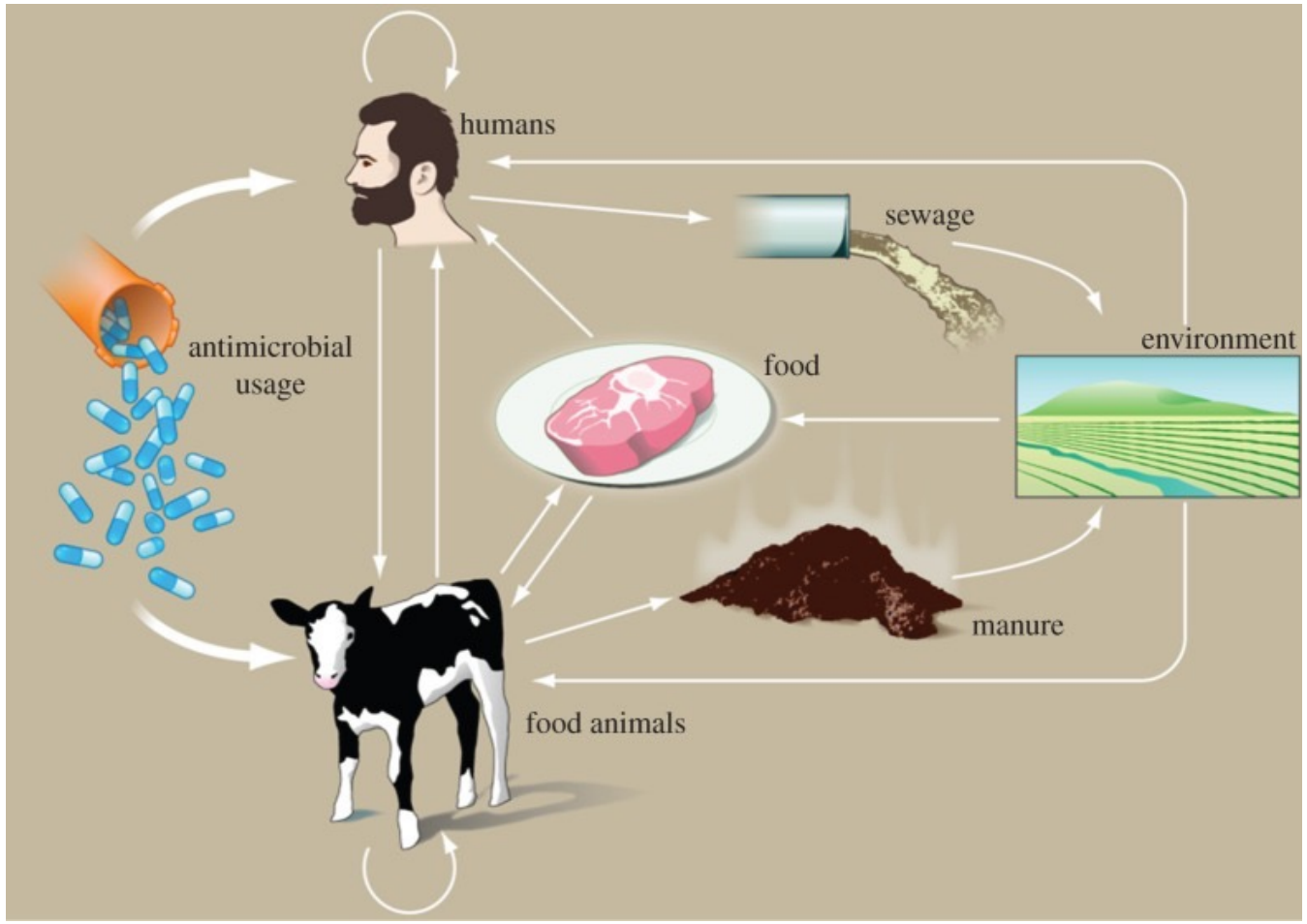
Government workers wear protective gear to collect poultry for slaughter during an outbreak of avian influenza on the Ivory Coast. More than 70 countries have reported cases this year, according to the World Organization for Animal Health. (Legnan Koula/EPA-EFE)

AMR – another opportunity for One Health

Caused by unregulated use of antimicrobials
in agriculture, veterinary and human medicine

Global variation

- Prescribing
- Over-the-counter availability
- Animal growth promotion
- Environmental pollution
- Inadequate infection control
- Trade & travel spread MROs



One Health/AMR Survey*

Survey of Australian medical, veterinary, dental prescribers (400-500 of each)

? Knowledge & beliefs about AMR/AbR

Main findings: general agreement:

- Causes of AbR = unregulated antibiotic use; **human hospital** use
- Action required – supported One Health approach **BUT:**
  - **restrictive policies unhelpful – 'don't interfere with prescriber autonomy'**
  - **externalised responsibility – 'other groups more at fault than mine'**

Zhuo A, Labbate M, …Gilbert GL…Dominey-Howe D. Opportunities and challenges to improving antibiotic prescribing practices through a One Health approach: results of a comparative survey of doctors, dentists, and veterinarians. BMJ Open 2018;8:e020439. doi.org:10.1136/bmjopen-2017-020439

One Health/AMR Survey Veterinary subgroup

Small companion animal (SCA) vets:

- Prescribe more broad-spectrum antibiotics
- Barriers to better prescribing
  - e.g. cost/availability of diagnostic tests

- *"SCA veterinarians placed greater importance on the contribution of antibioticuse in livestock to AMR, than antibiotic use in companion animals."*

Livestock & equine vets:

- *"Despite reporting use of fewer, mostly narrow spectrum antibiotics of lower importance to human and animal health, livestock veterinarians were generally more aware of their potential contribution to AMR."*

Norris JM, Zhuo A, …Gilbert, GL, et al. (2019) Factors influencing the behaviour and perceptions of Australian veterinarians towards antibiotic use and antimicrobial resistance. PLoS ONE 14(10): e0223534. doi.org/10.1371/journal.pone.0223534

Conclusions

- Humans are highly dependent on animals
- Animals & humans thrive in healthy environments
- A One Health approach to disease prevention & response can benefit everyone

BUT

- Humans want to protect their (our) 'stuff' & acquire more, often at others' expense
- Disturbing the balance causes EIDs, pandemics, AMR (& climate change, famine, war, species extinction etc.)

"When will they (we) ever learn?" (Pete Seeger: Where have all the flowers gone ~1960)

References

- *Forbes, I. (2004). Making a Crisis Out of a Drama: The Political Analysis of BSE Policy-Making in the UK. Political Studies, 52(2), 342-357. https://doi.org/10.1111/j.1467-9248.2004.00483*
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Powerpoint version available, on request - lyn.gilbert@sydney.edu.au