WETENSCHAPPELIJK INSTITUUT
VOLKSGEZONDHEID
INSTITUT SCIENTIFIQUE
DE SANTÉ PUBLIQUE

One health approach : development of a risk assessment model for defining classes of risk of micro-organisms

A. Baldo, S. Welby, C.D. Do Thi, A. Leunda, P. Herman

Scientific Institute of Public Health - Biosafety & Biotechnology Unit
Rue Juliette Wytsmanstraat 14 | 1050 Brussels | Belgium
T +32 2 642 52 69 | F +32 2 642 52 92 | email: Aline.Baldo@wiv-isp.be | www.wiv-isp.be

Human pathogens

Class of risk	Disease	Spreading	Prophylaxis/ Treatment
1	none	/	/
2	yes	unlikely	present
3	serious	likely	present
4	extremely serious	very likely	absent

Animal pathogens

Class of risk	Disease	Spreading	Prophylaxis/ treatment	Economic impact
1	none	/	/	/
2	yes	unlikely	present	low
3	serious or epizootics	likely	present	medium
4	extremely serious epizootics or panzotics	Very likely	absent	high

Classification of micro-organisms

- In Belgium: common lists for human and animal pathogens
- Some micro-organisms not included in the lists
- Lists should be regularly revised

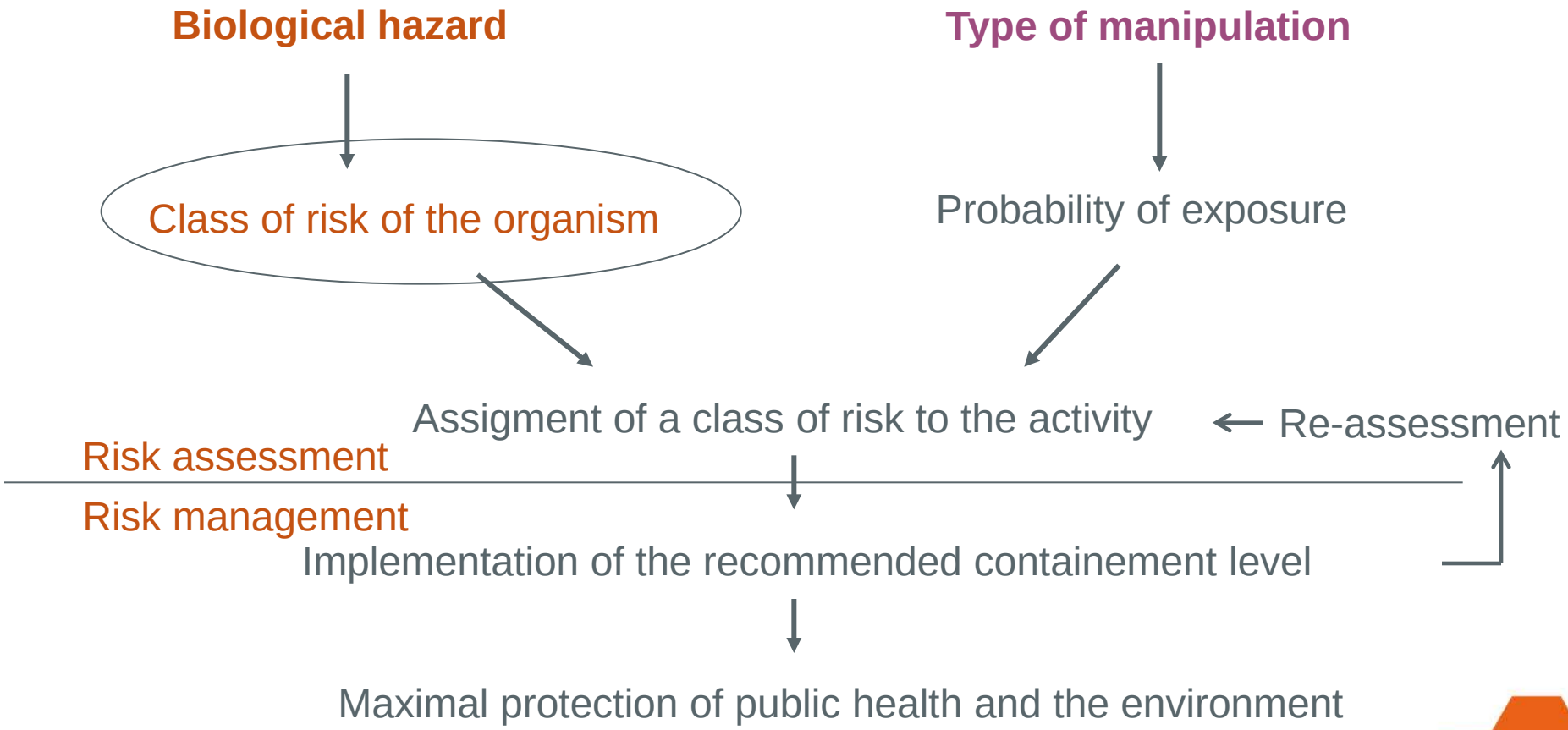
H	A	Virus
		Adenoviridae
		Atadenovirus genus
	2	Atadenoviruses
		Aviadenovirus genus (isolated from birds)
	2	Aviadenoviruses
		Mastadenovirus genus (including al human adenoviruses)
	2	Animal adenoviruses
2		Human adenoviruses
		Siadenovirus genus (isolated from reptiles and birds)
	2	Siadenoviruses
	2	Unclassified adenoviridae (isolated from a sturgeon and bat)

http://www.biosafety.be/RA/Class/ClassBEL.html

Criteria for classification

1. Pathogenicity
2. Transmission mode
3. Host range
4. Stability and persistence of the agent in the environment
5. Availability of effective prophylaxis
6. Availability of effective therapy
7. Economic and/or sanitary importance of an animal pathogen
8. Interspecies transmission

Risk assessment of an activity



The aim of our project is to propose an improved approach to strengthen the classification of a given micro-organism

Conceptual framework

- An online questionnaire
- Multichoice questions and open-ended questions
- Scientific experience of the experts

Conceptual framework

- RISK= Exposure * Likelihood * Consequence of event

Module1
Q1 Persistence in Environment
Q2 Host range
Q3 Spatio temporel spread

Module2
Q1 Invasiveness
Q2 Virulence
Q3 Infectious dose
Q4 Transmission mode

Module3
Q1 Prophylactic or curative treatment
Q2 Economic or welfare consequence (in animals)

Adapted from Kinney & Wiruth, 1976, and D'hondt et al., 2015.

Conceptual framework

- Semi-quantitative statistical approach
- Multi-expert
- 2 stage approach & stochastic (sheffield method):
  - First each expert states his opinion
  - Statistical analyse of the results
  - Second discussion on disagreements
- Possible to add weights: module level, expert level,…

Classification of influenza viruses

Belgian classification:

- Influenza A, B, C:
  - CR 2 for human
  - CR 3 for animals
- Influenza A viruses: more than 100 subtypes

	CR for humans	CR for animals
Belgium	Influenza A, B, C: CR2	CR3
UK	Influenza A, B, C: CR2 HPAI H5 H7, LPAI H7 H9, H1-3 of pandemic potential: CR3	/ SAPO4 (CL for animal pathogens)
Germany	Influenza A, B, C: CR2 H1N1 (1918), H2N2, HPAI, H7N9: CR3 HPAI transmissible between mammals: CR4	/
Switzerland	Influenza A, B, C and PR8 strain: CR2 for humans	CR3
Netherland	Avian strains: CR3 non avian strains: CR2	H5 and H7 strains: CR3
European community	Influenza A, B, C: CR2	/
Canada	CL 2 for diagnosis of H5 H7 and H9 strains CL3 for isolation, amplification of these strains CL2 for the other strains	/
CDC/NIH	LPAI: CR2; HPAI: CR3	/
Australian/New Zealand	Avian strains: CR3	/

Example of HPAI A H5N1 viruses

- HPAI A H5N1 (wild-type strains):
  - CR 3 for human
  - CR 4 for animals

Biosafety Risk Assessment and Management of Laboratory-derived Influenza A (H5N1) Viruses Transmissible in Ferrets

Aline Baldo[1]*, Amaya Leunda[1], Chuong Dai Do Thi[1], Didier Breyer[1], Katia Pauwels[1], Sarah Welby[2], Bernadette Van Vaerenbergh[1], and Philippe Herman[1]

[1]Scientific Institute of Public Health (WIV-ISP), Brussels, Belgium and [2]Veterinary and Agrochemical Research Center (CODA-CERVA), Brussels, Belgium

www.absa.org *Applied Biosafety* Vol. 18, No. 1, 2013

National working group

38 belgian experts invited :

- University
- Scientific institute of public health
- Federal Agency for safety and food chain
- Hospital
- superior health council
- Professional association of farmers
- Insitute of tropical medicine
- Veterinary and agrochemical research center
- …

Thanks to:

- Sarah Welby
- Philippe Herman
- Chuong Daï Do Thi
- Amaya Leunda

- Brussels-Capital Region
- Flemish Region
- Wallonia