



Zoonoses

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Introduction

Approximately 75 per cent of recently emerging infectious diseases affecting humans are diseases of animal origin; approximately 60 per cent of all human pathogens are zoonotic. It is against this background that we offer several modules on the subject of zoonoses in the larger One Health context. The candidate has a choice between basic and advanced modules. The introductory topics will cover basic information including definitions and an overview on the most important zoonoses including their source, impact and control. Advanced modules prompt the candidate to a more “lateral thinking” and learning approach of aspects such as hosts and drivers of emerging zoonoses.

Basic module 1: Zoonoses

Definitions and classifications:

The most common and universal definition of zoonoses one finds in the literature is the following: “Zoonoses are infections that can be transmitted between animals and humans”. This non-exhaustive blanket definition does, however not satisfy the curiosity of professionals interested in the epidemiology and control of specific infectious diseases, therefore it is helpful to take a closer and systematic look at the classification systems used to describe zoonoses.

The term *zoonosis* is derived from the Greek word for animal (=zoon) and disease (= noson). Zoonoses are often simply classified according to the groups of causative organisms, e.g. viral, fungal, bacterial, etc. A more functional classification system is based on the

route of transmission, e.g. via food, vectors or alternatively by direct contact. A third classification system attempts to distinguish between “old” or known zoonoses on the one hand and emerging and re-emerging zoonoses on the other hand. The underlying rationale behind this latest differentiation is found in the different nature of the diseases caused (chronic, insidious versus acute and highly contagious) and the resulting differences in socio-economic impact and level of public health responses launched.

Basic module 2: Zoonoses

Overview of major zoonoses worldwide:

This module provides an overview of important zoonoses worldwide and at the same time illustrates key features which are responsible for the success or failure of these pathogens to endure in our modern environment. The spectrum covers the exciting range from the well-known classical zoonoses such as rabies, anthrax, cysticercosis, brucellosis to name but a few, the well described but less widely distributed vector-borne zoonoses including West Nile virus, plague, Lyme disease and the wide range of emerging zoonoses from e.g. Ebola, HIV, SARS and Hendra virus infection.

Advanced module 1: Zoonoses

Human and animal hosts of zoonoses:

Investigation of the different roles hosts play in the maintenance and dissemination of zoonotic pathogens (who is the culprit and who is the victim?).

This module deals with the critical evaluation of the role of specific animal species as well as humans in



the epidemiology and hence the public health implication of particular zoonoses. Once the pathogen's transmissibility between species has been characterized, it is possible to define the role of host species in the disease ecology and dynamics. This in turn is an essential step not only for developing effective disease control measures but for targeting them at the correct and critical host species.

Advanced module 2: Zoonoses

Drivers for the emergence of zoonotic pathogens:

Broadly speaking the animal/human interface is core to the transmission of zoonotic pathogens from animals to humans as well as for the emergence of new zoonotic pathogens from animals. This module explores the diverse predisposing factors which drive disease emergence at the animal/human interface according to a) the pathogen (e.g. antimicrobial resistance), b) the environment (e.g. destruction of wildlife habitats has facilitated wildlife/human contacts and led to the emergence of diseases such as Ebola), and c) human host related factors (e.g. increasing human population).

Advanced module 3: Zoonoses

Impact of zoonoses:

A holistic appraisal of the diversity of implications of zoonoses goes beyond the direct effects on animal and human health and includes investigation of the socio-economic consequences which ultimately define how important the effects of a zoonosis are on human livelihoods. These effects are difficult to quantify and often need a multidisciplinary approach. The Global Burden of Disease captures the impact of zoonoses (and other diseases) on human health in terms of disability-adjusted life years (DALYs). The reader will be introduced to the key principles of this measure of population health.

