GOBIERNO DE ESPAÑA
MINISTERIO DE SANIDAD, SERVICIOS SOCIALES E IGUALDAD

Risk Assessment conceptual frame

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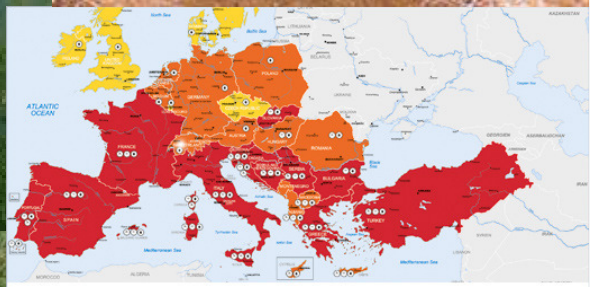
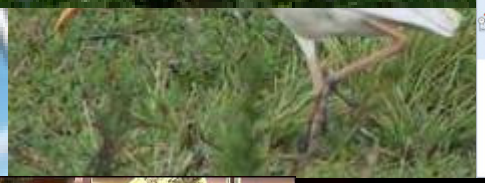
7.03.2013

CCAES
Centro de Coordinación de Alertas y Emergencias Sanitarias





Incidencia baja
(1-2 enfermedades endémicas)

Incidencia alta
(5-8 enfermedades endémicas)

Incidencia media
(3-4 enfermedades endémicas)

Incidencia percibida
(5-8 enfermedades endémicas)

All-hazard approach and the IHR

Hazard is a dangerous phenomenon, substance, human activity or condition that **may** cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

All-hazard approach

Natural hazard
Technological hazard
Man-made event

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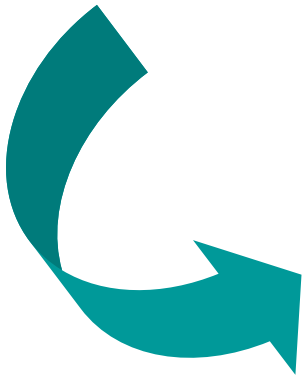
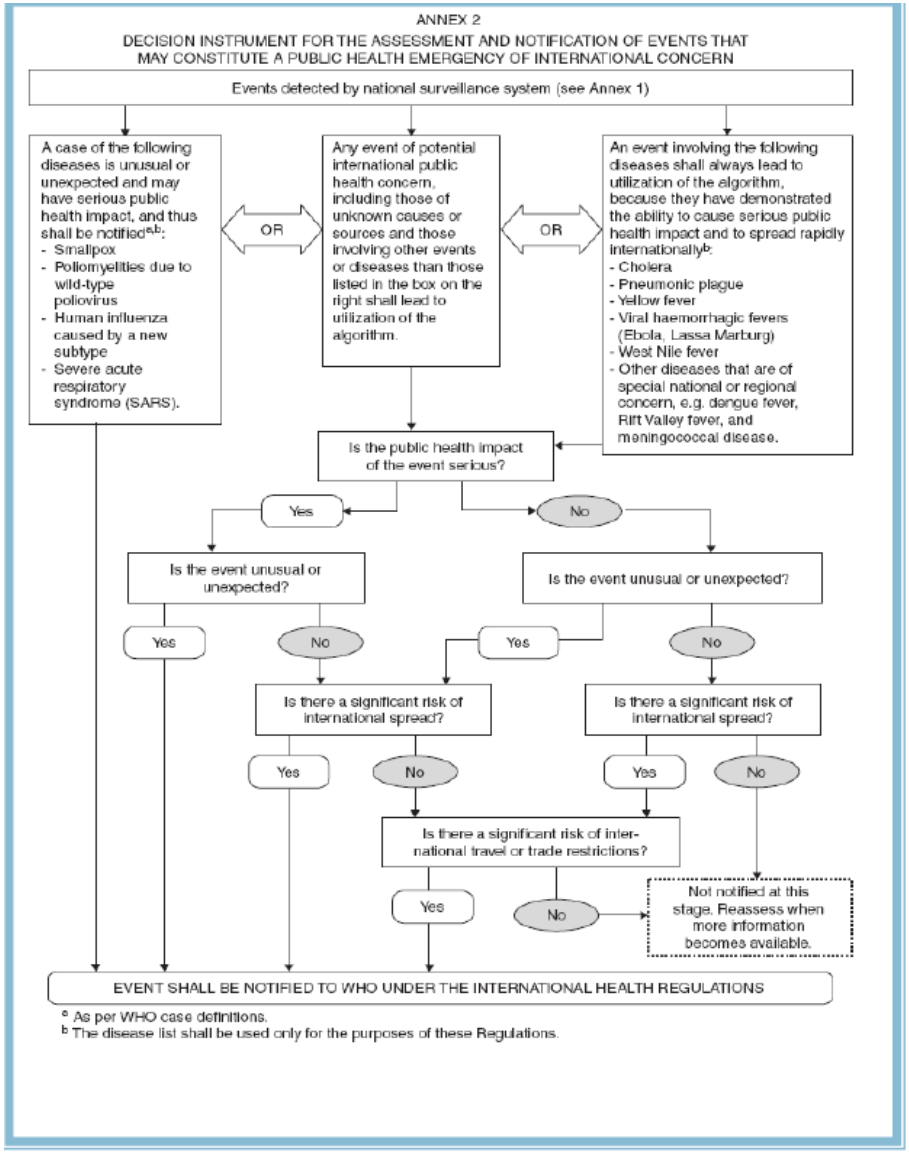
Negative consequences for human health

All-hazard approach and the IHR

Risk Assessments on public health events



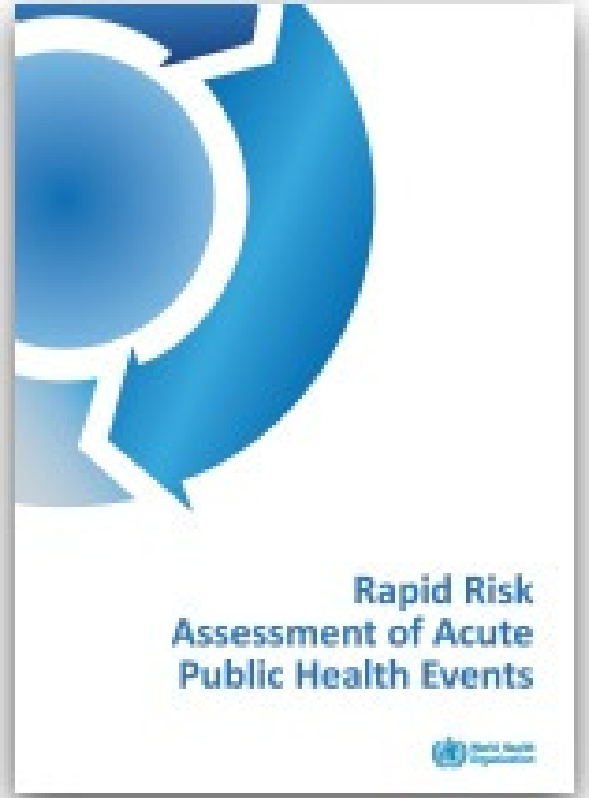


All-hazard approach and the IHR

IHR core capacity requirements for surveillance and response:

1. National legislation, policy and financing
2. Coordination and NFP communication
3. **Surveillance**
4. **Response**
5. Preparedness
6. Risk communication
7. Human resources
8. Laboratory services

Risk Assessment Technical documents



WHO

ECDC

Purpose of the Risk Assessment

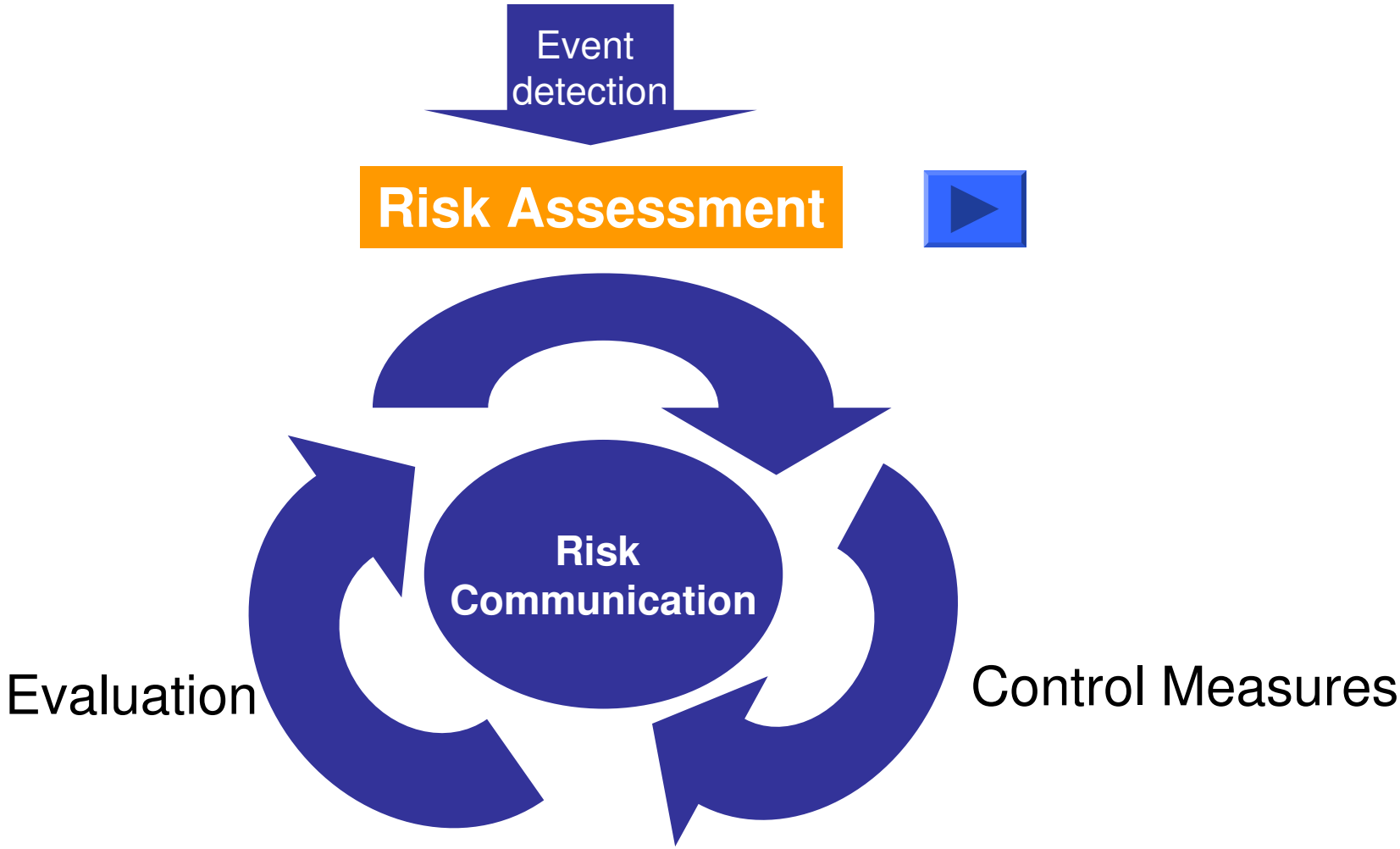
- To reduce or prevent disease in affected populations

- To reduce negative social and economic consequences

Purpose of the Risk Assessment

- Additional benefits include:
  - Evidence-based decision-making
  - Implementation of appropriate and timely control measures
  - More effective operational communication
  - More effective risk communication
  - Improved preparedness

The Risk Management Cycle



Detection and confirmation of a PHE-hazard

Event-based surveillance

EWRS
Alert Units of MS
WHO-IHR
DSN's
ELDSNET
EPIS
BSN
EMEA, EFSA
MedISys
GPHIN
Promed
OIE
FAO
…

Events

Capture
Filter
Validate

Indicator-based surveillance

Data

Collect
Analyze
Interpret

National Surv. Network
DSN's
BSN
Laboratory Network

Signal

Public Health Risk

Investigate

Control measures

Disseminate/ Notify

EWRS
European countries
European Commission
AACC
WHO-IHR

ECDC framework

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Risk identification

- Has the event been reported by an official source?
- Has the event been reported by multiple independent sources?
- Does the event description include details about time, place and people involved?
- Is the clinical presentation of the cases described?
- Has a similar event been reported previously?

Action taken as a result of triage and confirmation of an event

❀ Reported event is proved to be a false rumour

~ Event is confirmed but is not an immediate public health risk

➔ Event is confirmed and may be considered an immediate public health risk

Formal risk assessment vs rapid

- Threat is detected but is not an immediate public health risk for your country
- Scope & Methodology
  - More time to assess all factors that can affect the risk in the country
  - RAT
  - Recommendations
  - Literature review

Steps in the risk assessment

1. Assembling the risk assessment team
2. Formulating risk questions
3. Undertaking the risk assessment
4. Risk characterization

1. Assembling the risk assessment team

- One person as a coordinator
- Specialist expert knowledge (toxicology, animal health, food safety, radiation protection)
- Links RAT-Communication specialist (or included)
- Working groups for different types of hazards
- Links between health services & other responsible sectors / agencies (Surveillance network, laboratory network)

Role of the expert

- Identify and seek advice from key experts
  - **Within country**: national experts identified through personal contact/national public health body websites. Fixed experts
  - **Internationally**: reports of previous outbreaks (promed, EWRS, IHR, websites), disease specific networks…
- Response based on:
  - Previous experience;
  - Opinion;
  - Knowledge of evidence base (published and grey literature)

2. Formulating risks questions

Who is likely to be affected/specific risk groups?

What is the likely exposure to the hazard?

When, why and how a population might be adversely affected by exposure to a hazard

literature reviews
epidemiological investigations
enhanced surveillance
consultation with disease experts
surveys and research

What is the likelihood of exposure to the hazard if no action is taken?

What are the consequences (type and magnitude) to public health if the event were to occur?

2. Formulating risks questions

- The **population at risk**
- The **level** at wich the RA is taking place
- The **technical and policy disciplines** and **agencies.**
- Their **collective experience** with the type of event they are assessing
- The **level of risk**
- The level of **perceived external interest** of the event

3. Undertaking the risk assessment

Systematic process for gathering, assessing and documenting information to assign a level of risk

Risk Characterization

Hazard Assessment (I)

- Includes:
  - Identifying the hazard(s)
  - Characterize the hazard
  - Ranking potential hazards when more than one is considered a possible cause of the event
- Biological, chemical, physical and radionuclear hazards, environmental, unknown origin

Hazard Assessment (II)

- The relative likelihood of a hazard can be determined by:
  - The clinical features and natural history of the disease in humans or animals
  - Timing of the event and the speed with which the event evolves
  - Geographical area and settings affected
  - The persons and populations affected
  - …

Exposure assessment (I)

- Evaluation of the exposure of individuals and populations to likely hazards
- Key output of the assessment:
  - Number of people (or group) known or likely to have been exposed
  - Number of exposed people or groups who are likely to be susceptible

Exposure assessment (II)

- Information required to answer these questions:
  - Modes of transmission
  - Dose-response
  - Incubation/latency period
  - Case fatality rate
  - Estimation of the potential for transmission
  - Vaccine status of exposed population

Context Assessment

- Evaluation of the environment such as:
  - –Climate
  - –Vegetation
  - –Land use
  - –Water systems
  - –The health of the population
  - –Infrastructure
  - –Culture practices
  - –Beliefs

Social, technical and scientific, economic, ethical, and policy and political factors

↓

Likelihood of exposure/consequences

↓

Level of risk

Context Assessment

- Key output of the context assessment:
  - Factors ←→CONTEXT increase a population's vulnerability
  - Factors ←→ CONTEXT reduce the population's risk of exposure
  - What is the likelihood that all suspect cases can be identified?
  - What is the availability and acceptability of effective preventive measures and of treatment or supportive therapies?

4. Risk characterization (I)

Risk= hazard impact * likelihood of occurrence

The impacts are dependent on preparedness or preventive behaviour (timely evacuation,…)

Impact expressed in terms of **vulnerability and exposure**

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Risk characterization (II)

- Vulnerability (V) is defined as the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

- Exposure (E) is the totality of people, property, systems or other elements present in hazard zones, that are thereby subject to potential losses.

$$\text{Risk} = f(p*E*V)$$

- The impacts of a hazard are also a function of the preventive and preparatory measures that are employed to reduce the risk

Risk characterization (III)

- **TECHNICAL AND SCIENTIFIC IMPACTS**
  - Morbidity, mortality and long term disability
  - Effectiveness of control measures
  - Side effect of treatment or prophylaxis

- **ECONOMIC IMPACTS**
  - Direct financial costs for response activities for individuals
  - Indirect costs (individual and family ability)
  - Effect on travel and trade
  - Effect on tourism

- **ENVIRONMENTAL IMPACTS**
  - Negative (or positive) effects of control measures on natural environment

Risk characterization (IV)

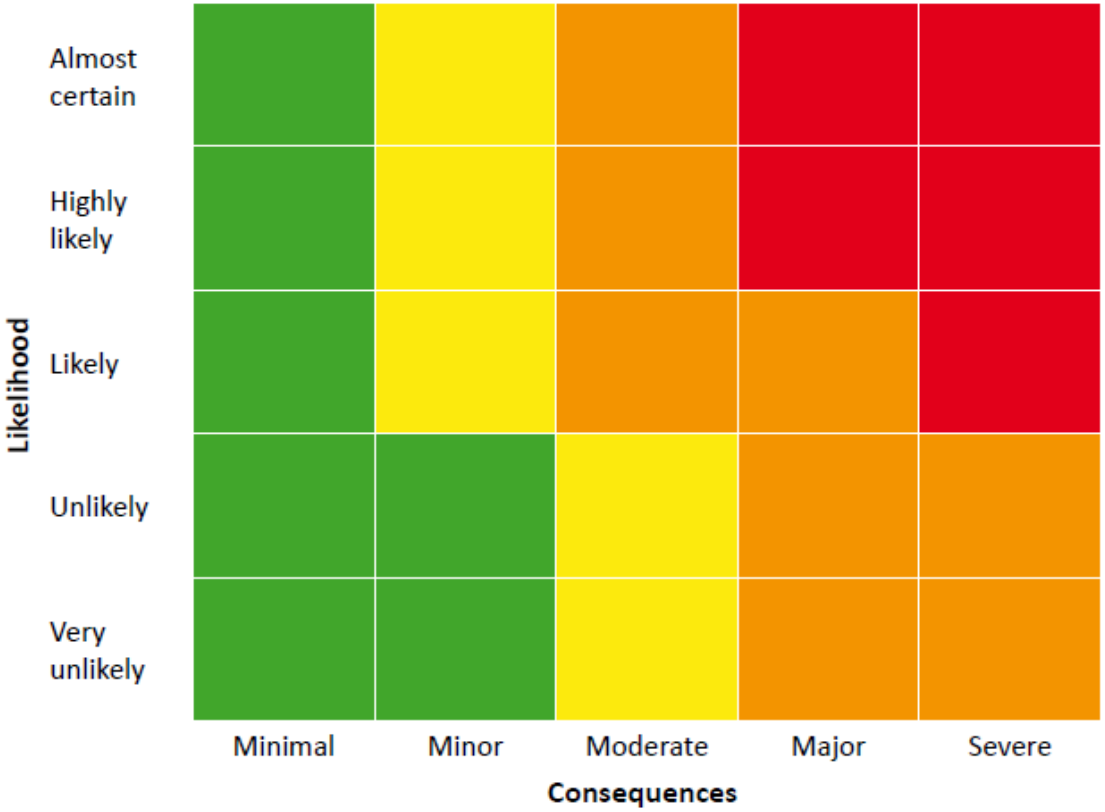
- **POLITICAL IMPACTS**
  - Political implications (view o Minister of Health or opposition parties)
  - Diversion of resources from other programmes and projects to support the response
  - Imminent elections and other politically charged situations

- **SOCIAL IMPACTS**
  - Acceptability of control measures by the affected community
  - Social stigma from being a case of an infectious disease
  - Psychological impacts

Risk characterization (III)

Risk matrix

Figure 3a: A risk matrix showing clearly delimited boundaries between categories



Source: WHO-RA Manual

Risk characterization (IV)

CONSEQUENCES

Level	Consequences
Minimal	Limited impact on the affected population Little disruption to normal activities and services Routine responses are adequate and there is no need to implement additional control measures Few extra costs for authorities and stakeholders
Severe	Severe impact for a large population or at-risk group Severe disruption to normal activities and services A large number of additional control measures will be needed and most of these require significant resources to implement Serious increase in costs for authorities and stakeholders

Risk characterization (V)

PROBABILITY

Level	Definition
Almost certain	Is expected to occur in most circumstances (e.g. probability of 95% or more)
Highly likely	Will probably occur in most circumstances (e.g. a probability of between 70% and 94%)
Likely	Will occur some of the time (e.g. a probability of between 30% and 69%)
Unlikely	Could occur some of the time (e.g. a probability of between 5% and 29%)
Very unlikely	Could occur under exceptional circumstances (e.g. a probability of less than 5%)

Risk characterization (V)

LEVEL OF RISK

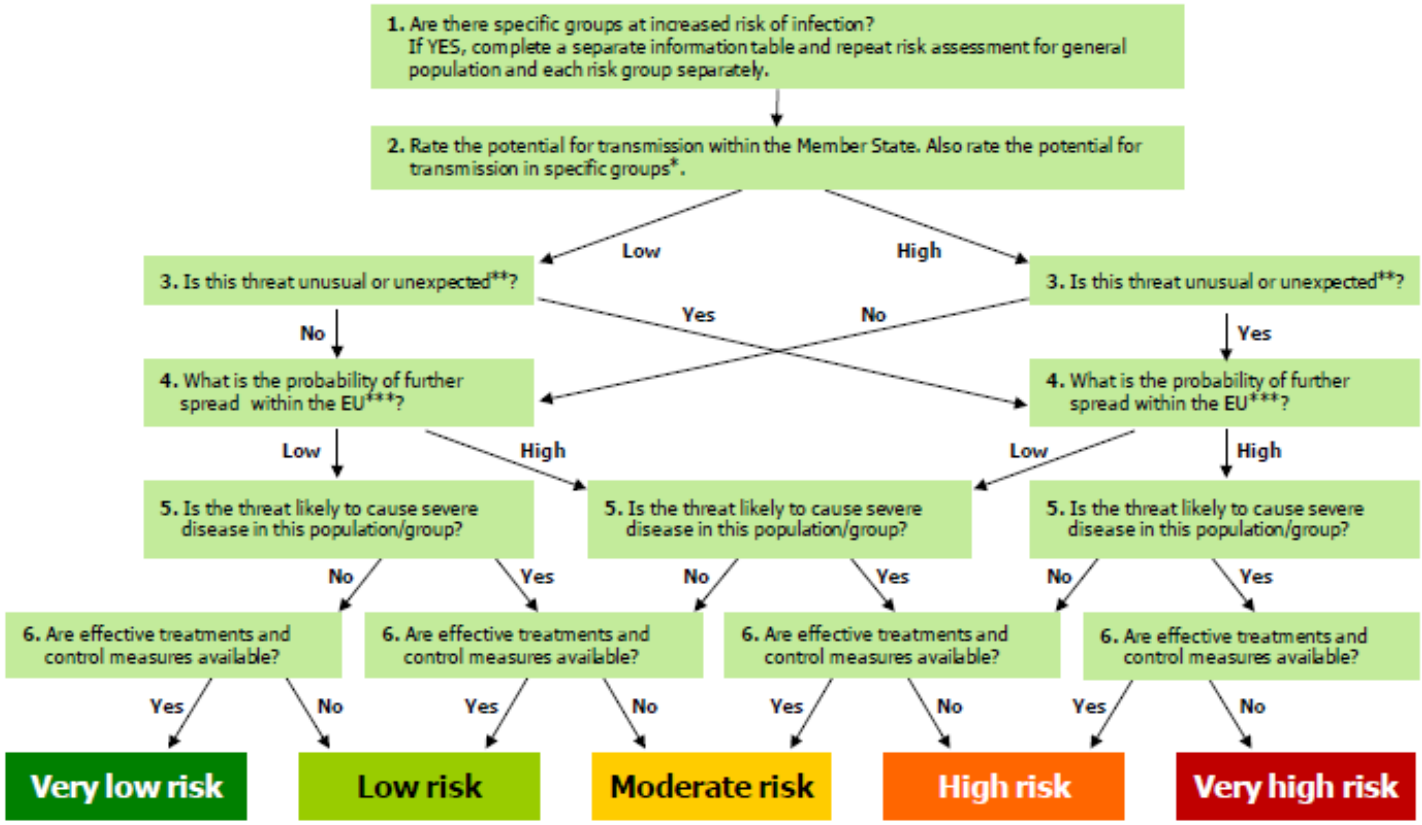
	Level of overall risk	Actions
	Low risk	Managed according to standard response protocols, routine control programmes and regulation (e.g. monitoring through routine surveillance systems)
	Moderate risk	Roles and responsibility for the response must be specified. Specific monitoring or control measures required (e.g. enhanced surveillance, additional vaccination campaigns)
	High risk	Senior management attention needed: there may be a need to establish command and control structures; a range of additional control measures will be required some of which may have significant consequences
	Very high risk	Immediate response required even if the event is reported out of normal working hours. Immediate senior management attention needed (e.g. the command and control structure should be established within hours); the implementation of control measures with serious consequences is highly likely

Risk characterization (IV)

Algorithm combining probability and impact

Figure 1: Single algorithm combining probability and impact resulting in single overall risk level (option 1)

If in doubt (e.g. due to insufficient evidence), select the higher-risk option.



Source: ECDC Operational guidance on rapid risk assessment methodology

Level of evidence

- Confidence in the veracity of the information or data
- Depends on:
  - Reliability, completeness and quality of the information used
  - Assumptions made with respect to the hazard, exposure and context
- Study design, strength of association, evidence of dose response, consistency with other studies/expert opinion, bias, inconsistency conflicting opinion

Control measures

- Identify urgency and extent of the control measures needed.

- Rank control measures according to effectiveness in:
  - Further spread or dissemination of a hazard
  - Consequences of applying each control measure

- Consider all aspects of consequences

Risk communication

- Communication at each step
- To provide key messages at regular intervals
- Two components:
  - Operational communication: between RAT and relevant stakeholders
  - Communication with the public
- How and in what format the information should be presented to stakeholders and the public

Monitoring and evaluation

- RA repeated as information become available
- Well documented
- When the event is concluded formally reviewed

Thank you