



The Pandemic  
**EVIDENCE** Collaboration

# Pillar 1

## **Diagnostics and Transmission**





# Non-Pharmacological Interventions: Working Pillars and Cross-Cutting Themes

Cross-cutting themes	Pillar 1 Diagnostics and Transmission	Pillar 2 Interventions and Evidence	Pillar 3 Practice and Policy
<b>Theme 1: Definitions and Nomenclature</b> Glossary of terms Taxonomy Classifications	Diagnostic criteria Testing methods - PCR, lateral flow, rapid tests, serology, WGS Testing strategies	Types of NPIs: Individual vs community vs population-based settings Identifying and applying NPIs to various settings Developing, testing and applying Novel NPIs in a pandemic	Assessing the cost-effectiveness of interventions in pandemics Assessing waste during pandemics and impact on policy
<b>Theme 2: Data Challenges</b> Inputs to transmission models Outcomes – mortality, morbidity, infection, hospitalisations, other Data veracity Data sharing	Modes of Transmission <ul style="list-style-type: none"><li>• Animal-animal studies</li><li>• Human-animal studies</li><li>• Human challenge studies</li></ul> Study Quality and Standards A framework for evidence assessment, synthesis, and adjudicating study quality	Assessing the benefits and harms of NPIs  Developing a framework for evidence synthesis Developing evidence during and outside of pandemics  Study design for high quality: RCTs, CRTs, cohort studies and others Outcomes – mortality, infections, hospitalisations, morbidity	Developing a framework for grading policy Developing effective policy  Policy for intervening in individuals and populations Adjudicating study quality for policy Reporting criteria Role of Journals
<b>Theme 3: Methodological Issues</b>	Access to data with bias assessments Setting minimum methodological standards Reporting methods	Role of the environment and infrastructure Waste in the scientific literature Role of laboratory studies Use of models and predictive modelling	Role of media and dissemination in effecting policy Behavioural tactics in setting policy
<b>Theme 4: Funding</b>	Short term / long term sustainable / internal and external grants, conference revenue, leveraging		

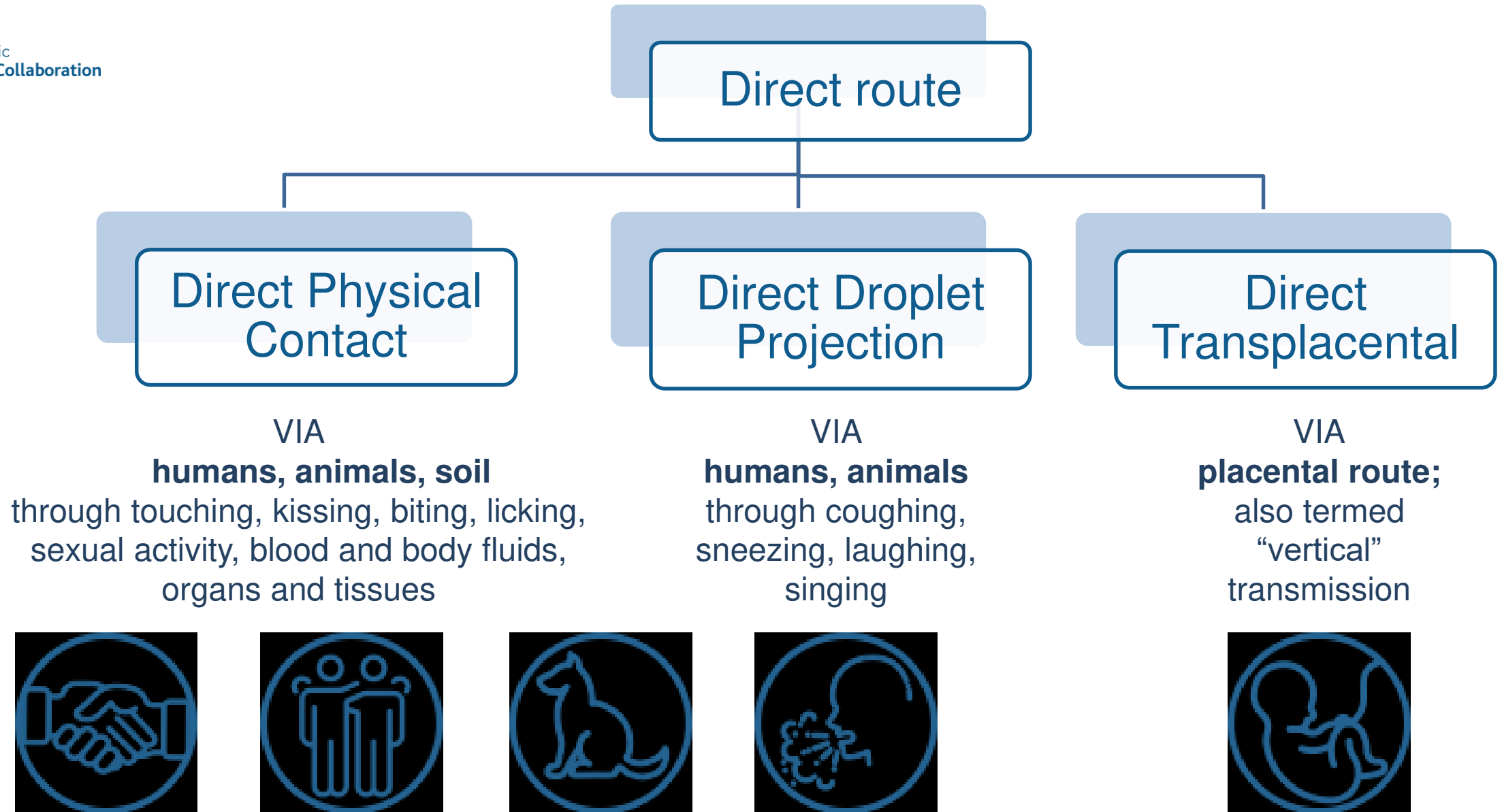


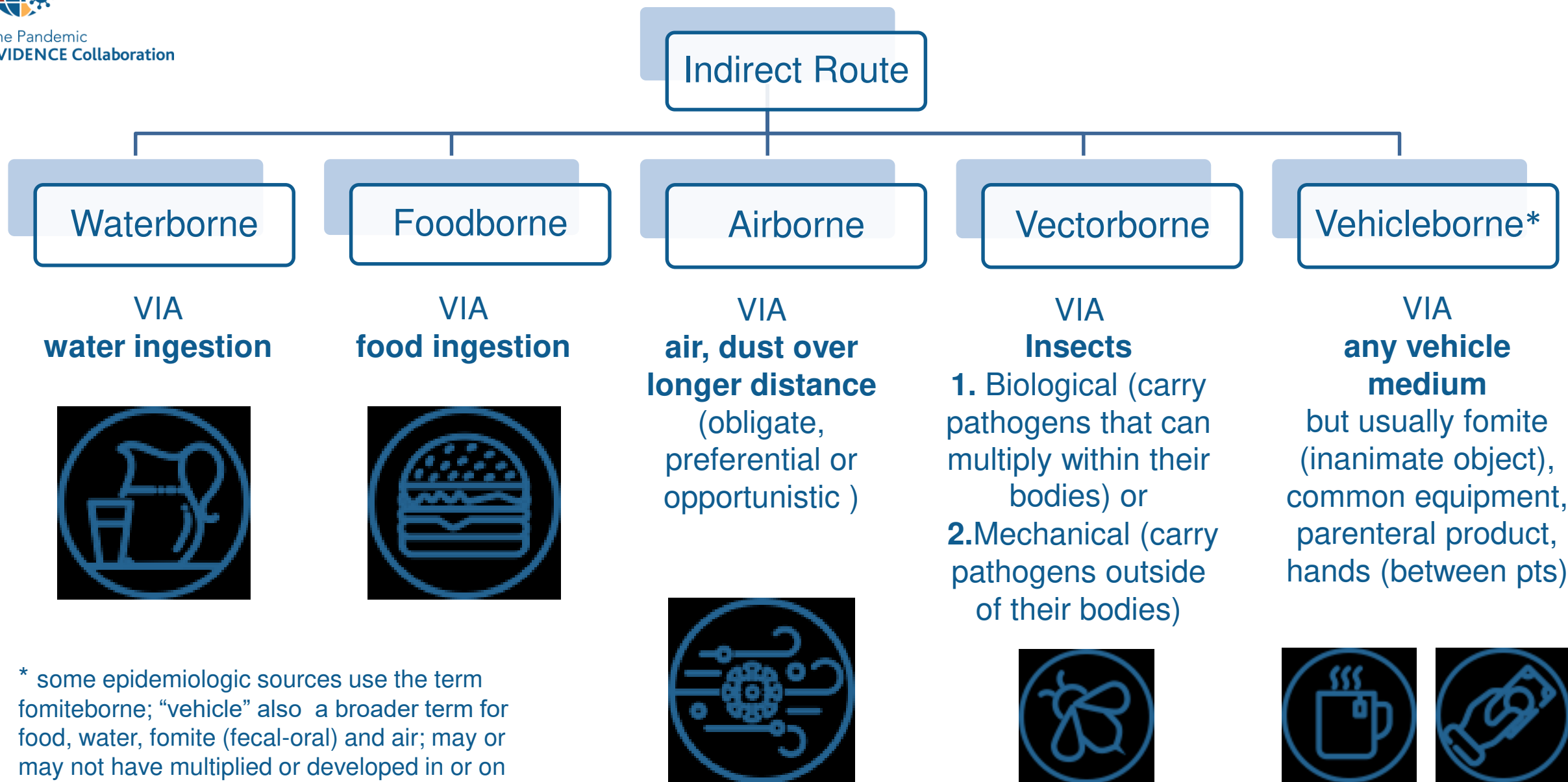
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# Modes of Transmission for Infectious Microorganisms

- Many descriptions from epidemiologic literature and modified by various disciplines to meet their needs
- Provides a description of how a microorganism moves from a reservoir to a susceptible host known as the “chain of transmission”
- A core classification used for a mode of transmission is “Direct vs Indirect” which is defined below and provided in diagrammatic form in the next slides
  - **Direct route** from reservoir to host
  - **Indirect route** through an intermediate step reservoir to host







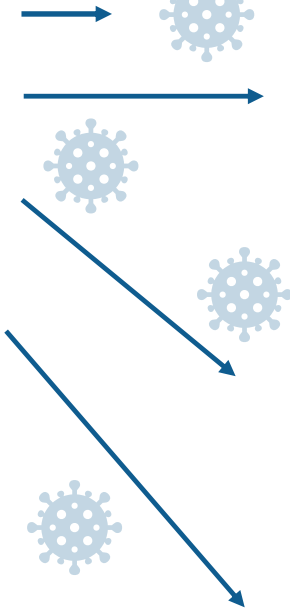
\* some epidemiologic sources use the term fomiteborne; “vehicle” also a broader term for food, water, fomite (fecal-oral) and air; may or may not have multiplied or developed in or on the vehicle



## Adults and Children



Asymptomatic  
Presymptomatic  
Symptomatic



### Mode of Transmission

Direct contact



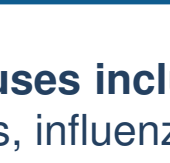
Direct Droplet Deposition



Fomite (surfaces)



Orofecal



Airborne

### Settings of Transmission



Aircraft



Hospitals/  
Care Homes



Schools



Materials  
Infrastructure

### Methods of Identification and Verification

Direct staining;  
molecular methods  
e.g. PCR

Viral Cultures



**Common human respiratory viruses include** rhinovirus, coronavirus, adenovirus, influenza, metapneumovirus, parainfluenza and respiratory syncytial virus

### History and Assessment:

Look back at the role of the Common Cold Unit and other human challenge experiments

Assessment of causality transmission and risk of bias



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# Why are Modes of Transmission Important: General Principles

- A pathogen may exploit multiple modes of transmission
- There may be a predominant mode of transmission and those of lesser importance in usual natural settings
- Situational settings/circumstances which modify/change the natural mode of transmission must be taken into context
- Identifying modes of transmission and modifying influences allow for optimal mitigation and prevention measures



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# Assessing Pathogen Transmission Causality

- First formulation of principles of causality between a microbe and disease were **Koch and Löffler postulates** 1884
- **Robert Huebner's** 1957 points to assess viral causality
- **Bradford Hill's** 1965 criteria for association: strength, consistency, specificity, temporality, biological gradient, plausibility, coherence, experiment, analogy
- **Gwaltney and Hendley's** 1978 proposed postulates for respiratory virus transmission
- **Fredricks and Relman's** 1996 proposed reformulation of the original Koch's postulates
- **Byrd and Segre** in 2016 advocate for genetic sequencing
- **Jefferson et al** 2022 hierarchal framework viral transmission







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