Pillar 1 Diagnostics and Transmission

John Conly, Annette Plüddemann, Tom Jefferson, Cecilia Rosca, Carl Heneghan April 11, 12 2024



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			
Theme 1: Definitions and Nomenclature 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 s- Developing, testing and applying Novel NPIs in a pandemic Assessing the benefits and harms of NPIs	Assessing the cost-effectiveness of interventions in pandemics Assessing waste during pandemics and impact on policy Developing a framework for grading policy Developing effective policy			
Theme 2. Data Challenges Inputs to transmission models Outcomes - mortality, morbidity, infection, hospitalisations, other Data veracity Data sharing	 Modes of Transmission Animal-animal studies Human-animal studies Human challenge studies Study Quality and Standards A framework for evidence assessment, synthesis, and adjudicating study quality	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, hospitalizations, morbidity	Policy for intervening in individuals and populations Adjudicating study quality for policy Reporting criteria Role of Journals			
Theme 3. Methodological Issues	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			
Theme 4. Funding	Short term/ long term sustainable/internal and external grants, conference revenue, leveraging					

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











VIA humans, animals, through coughing, sneezing, laughing, singing,



VIA placental route; also termed "vertical" transmission









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

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

Assessing Pathogen Transmission Causality

- First formulation of principles of causality between a microbe and disease were **Koch and Löeffler postulates** 1884
- **Robert Huebner's** 1957 points to assess viral causality
- Bradford Hill 1965 criteria for association: strength, consistency, specificity, temporality, biological gradient, plausibility, coherence, experiment, analogy Gwaltney's and Hendley's proposed postulates for respiratory virus transmission 1978
- Fredricks and Relman's 1996 proposed reformulation of the original Koch's postulates
- Byrd and Segre in 2016 advocate genetic sequencing
- Hierarchal framework 2022 Jefferson T et al

Tracker

Theme 1 D&Trans	Systematic Review	JC	TJ, JC, AP, CH	Link	requires funding (14 SRs)
Theme 1 D&Trans	Systematic Review	CR	TJ, JC, AP, CH	Link	Link to manuscript under preperation
Theme 1 D&Trans	Systematic Review	CH (ET)	AP	<u>Link</u>	Elizabeth Thomas Potential Fellow based in Australia link with Mark Jones
Theme 1 D&Trans	Systematic Review	JC		<u>Link</u>	
Theme 1 D&Trans	Systematic Review	CH		<u>Link</u>	likely case reports
Theme 3 Evidence	Methods			Link	
Theme 1 D&Trans	Systematic Review	,		Link	CG REPORT 6: Effects of COVID-19 in Care Homes – A Mixed Methods
Theme 1 D&Trans	Systematic Review	,		<u>Link</u>	
Theme 1 D&Trans	Systematic Review	,		Link	
Theme 1 D&Trans	Review	CH	AP	Link	Folder Google sheet for <u>Tyrell Studies</u>
Theme 1 D&Trans	Systematic Review	CR		Link	https://drive.google.com/drive/folders/1YH56Y8AOc5Na8U1EKedg7IXAd
Theme 1 D&Trans	Methods	AP		Link	Folder
Theme 1 D&Trans	Systematic Review	CR		<u>Link</u>	Link to Folder on SARsCOV-2
Theme 1 D&Trans	Systematic Review	CR		Link	
Theme 1 D&Trans	Tracker			<u>Link</u>	Link
Theme 3 Evidence	Methods	CH		Link	Improving disseminaiton/ build a website with description, quality, impact
Theme 1 D&Trans	Systematic Review	,		Link	
Theme 1 D&Trans	Systematic Review	JC		Link	
Theme 1 D&Trans	Systematic Review				