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**Preprint:**

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# SUPPLEMENTARY MATERIAL 2: THE AMR DEVELOPMENT MAP TOOL

The AMR development map tool below is designed to aid conceptual modelling in economic evaluation of AMR interventions. The tool guides the reader through questions on (1) the distribution of effects across AMR burden dimensions and (2) considers the specifics of the setting of interest to consider the wider ecosystem connectivity and the resulting sources of spillover. The outcome of this working sheet is an outline for the system of analysis that represents the scope of the model and the effects of interest, along with potential sources of spillover beyond the system of analysis.

*AMR development map tool: Questions to support use of AMR development map in conceptual modelling with case study responses (screening and isolation intervention within a UK city hospital setting).*

<b>Case study description</b>	Carbapenemase-producing Enterobacterales (CPE) screening and isolation intervention in a hospital setting
<b>WHAT IS THE INTERVENTION?</b>	Screening and isolation
<b>(1) WHAT AMR PROCESS DRIVERS DOES THE INTERVENTION TARGET?</b>	
<i>Given the AMR development map</i>	
Category	Reduce (4) presence of transmission pathways via isolation and decrease the (5) resistant infection/colonisation burden.
Explanation	Screening and isolation will identify patients and subject them to isolation measures to decrease their contribution to the force of infection through decreasing transmission pathways (resulting in lower probability of other patients acquiring a resistant colonisation/infection within the setting) and will also decrease the overall resistant infection burden (through transmission and progression).
<b>WHAT IS THE SETTING OF INTEREST (TYPE OF SETTING/-S &amp; GEOGRAPHICAL AREA)</b>	
	An intensive care unit (ICU) in a UK urban hospital
Is the site of intervention same as effects? Explain	Effects at the site of intervention will be quantified and the need to quantify effects outside of the intervention site will be explored.
<b>(2) WHAT IS THE OVERALL CONNECTIVITY/ PERMEABILITY OF THE SETTING OF INTEREST?</b>	<p>(1) A UK city hospital is likely be well isolated from other sectors, such as agriculture, wildlife and environment, hence the connectivity between sectors is low.</p> <p>(2) There will likely be connectivity between hospital units, carried by the transfer of patients and movement of staff/equipment. Depending on the layout of the unit, different units may also share the same space in the building, which would increase the connectivity. Sanitation strategies in place will influence the expected transfer of the pathogen/connectivity. Hence, depending on the specifics of the setting, the connectivity may be low to high.</p> <p>(3) Admitted and discharged patients will connect the hospital of interest with community, other healthcare settings, such as long-term care facilities and other hospitals. Depending on the usual pathways of patients, the connectivity may be low to high.</p>
<b>(3) WHAT IS THE ANTICIPATED DISTRIBUTION OF INTERVENTION EFFECTS ACROSS THE AMR BURDEN DIMENSIONS?</b>	

Time	<p>The intervention will have:</p> <p>(1) short-term effects for the cohort of individuals targeted by the intervention (patients found to be colonised may receive different care to minimise their probability to progress to infection, which will result in fewer infections, while others will have a reduced probability of acquiring the pathogen),</p> <p>(2) medium-term indirect effects for the future cohorts of patients through decreased transmission.</p> <p>The indirect effects over time associated with disease diffusion will depend on the pathogen dynamics and specific setting features (further research for the specific context required).</p>
Physical space	<p>The intervention will have:</p> <p>(1) direct effects on the patients targeted by the intervention (patients found to be colonised will receive different care that will result in fewer infections, while others will have a reduced probability of acquiring the pathogen),</p> <p>(2) diffuse indirect effects across wider physical space through decreased transmission. This includes both wider hospital settings and settings outside the hospital, such as other health care facilities, community.</p> <p>The effects across physical space will depend on the features of the pathogen, the pathways and distance of movement of patients, staff, and equipment across and outside the physical outline of the setting of interest. The effects will also depend on existing other screening/sanitation strategies in place that might prevent further transmission.</p>
Effects to different sectors (One Health)	Given the specific setting of interest, this will likely result in indirect effects to the community and other health care facilities. Unlikely to impact other sectors within One-health framework.
Wider pathogen pool	Though CPE is the target pathogen in focus for the intervention, an isolation strategy will have effects on transmission on multiple types of pathogens found in the setting. It might be important to consider transmission effects on other key pathogens found in the setting.

#### (4) CONSIDERATION OF SPATIAL AND INTER-SECTORAL SCOPE OF SYSTEM OF ANALYSIS GIVEN THE WIDER ECOSYSTEM CONNECTIVITY/ PERMEABILITY CONSIDERATIONS

*The purpose of this section is to summarise the OPTIONS for spatial and inter-sectoral scope of analysis. Section below makes the choice given the outlined criteria.*

System of analysis boundary description	Permeability (L/M/H) *	Sources of spillover into the system of analysis (affects outcomes)	Sources of spillover out of the system of analysis (potentially relevant outcomes to include)	Relative impact of spillover (L/M/H) *	Note gaps in knowledge
1. Single unit	H	Admissions to the unit; staff; equipment	Movement of patients outside of the unit; staff; visitors; equipment.	H	Not addressed in this
2. Entire hospital	L	Admission of patients; food; staff, visitors	Discharge of patients; staff; visitors.	L	Not addressed in this
3. Hospital and connected health care facilities	L	Admission of patients; food; staff, visitors	Discharge of patients; staff; visitors.	L	Not addressed in this
<b>What is the preferred system of analysis option given permeability and what are the resulting sources of spillover?</b> <i>Aiming to (1) maximise capture of impactful elements of the system; (2) choosing feasible given available understanding of the mechanics; (3) potential trade-off between higher scope/complexity of the system of analysis and sources of spillover.</i>					
System of analysis (SA)	Entire hospital				
Sources of spillover into SA	Admission of patients; food; staff, visitors				

Sources of spillover out SA	Discharge of patients; staff; visitors
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<b>(5) CHOICE OF SYSTEM OF ANALYSIS AND THE SCOPE OF EFFECTS QUANTIFIED ACROSS THE AMR BURDEN DIMENSIONS</b>	
Time	(1) given that infection outcomes might result in death, lifelong individual time horizon should be considered; (2) Depending on the anticipated persistence of the effects, several time intervention time horizons should be considered; (3) given the indirect effects associated with decreased transmission, model time horizon past the intervention time horizon should be considered.
Physical space	In addition to direct effects, wider geographical effects of decreased transmission from discharged patients should be considered through (1) deciding on the geographical boundary that would be affected and (2) estimate changes to transmission and resulting health effects over chosen time horizon.
Effects to different sectors (One Health)	Given the specific setting and geographical region, reduction in hospital infection rates is not likely to have effects on other sectors but is likely to affect the community setting. An intervention is likely to decrease contribution to prevalence of pathogen in the community and prevent potential outbreaks in other settings (for example nursing homes and rehabilitation centres).
Wider pathogen pool	Effects on multiple pathogen transmission and resulting decrease in disease should be considered. Pathogens known to spread in the hospital of interest and expected to be prevalent in the isolated patient group should be considered for inclusion.
Sources of spillover into the system of analysis to consider	Admission of patients and underlying prevalence.

*\*L/M/H – refers to categories: low/medium/high. However, more detail is useful if available.*

*\*\* Options for setting of interest: combination of urban/semi-urban/rural/remote and tertiary hospital/specific specialty or unit within a hospital/primary care/community health centre/community non-health/animal health or veterinary sector/agriculture/wildlife/environment*

*\*\*\* System of analysis vs sources of spillover differentiate between the system that you are modelling the dynamics of and static sources of output/input.*