

## Research Themes

There are 8 research themes within CoSTAR-HS:

| Research Themes  | Specific Aims  |
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| 1 Multiple Combination Bactericidal Test (MCBT) to guide XDR-GNB (especially CRE) treatment                | <ul style="list-style-type: none"> <li>▪ To identify appropriate antimicrobial combination therapy for the treatment against Extensively Drug-Resistant Gram-Negative Bacilli (XDR-GNB) especially Carbapenem-Resistant Enterobacteriaceae (CRE) organisms via antimicrobial combination testing</li> <li>▪ To build rapid platforms for antimicrobial combination testing to impact clinical care in a timely manner</li> </ul>   |
| 2 Novel diagnostics for the identification of Antimicrobial Resistant (AMR) determinants                   | <ul style="list-style-type: none"> <li>▪ To build, validate and implement a rapid platform to determine clinically relevant AMR mechanism</li> </ul>   |
| 3 Novel infection control strategies assessment  | <ul style="list-style-type: none"> <li>▪ To evaluate the efficacy/cost-effectiveness of various environmental cleaning methods in the local clinical ward setting</li> </ul>   |
| 4 Optimizing antimicrobial stewardship programmes (ASPs) in Singapore                                      | <ul style="list-style-type: none"> <li>▪ To evaluate various combinations of antimicrobial stewardship strategies to determine the most cost-effective ASP model</li> <li>▪ Establish the optimal ASP practitioner-to-bed ratio required for effective antimicrobial stewardship in various levels of patient care</li> </ul>  |
| 5 Carbapenemase producing Enterobacteriaceae in Singapore (CaPES): Epidemiology, risk factors and outcomes | <ul style="list-style-type: none"> <li>▪ To establish an ongoing surveillance network to:               <ol style="list-style-type: none"> <li>i. Study the clinical and molecular epidemiology of Carbapenemase-producing CRE (CP-CRE) in Singapore</li> <li>ii. Identify emerging AMR in Singapore</li> <li>iii. Identify CP-CRE outbreak and facilitate the investigation of the outbreak</li> </ol> </li> </ul>  |
| 6 Integration of whole genome sequencing (WGS) into infection control                                      | <ul style="list-style-type: none"> <li>▪ To assess if integration of WGS with current international standard-of-care infection control would increase the effectiveness of infection control interventions, and improve clinical outcomes. Specific outcomes assessed during interrupted-time-series modeling would include the following endpoints:               <ol style="list-style-type: none"> <li>i. Rates of CP-CRE-carriage detection</li> <li>ii. Rates of clonal CP-CRE-carriage with spatiotemporal overlap (direct internal ward transmission)</li> <li>iii. Rates of admission screening detection of CP-CRE-carriage</li> <li>iv. Crude and attributable CP-CRE mortality rates</li> </ol> </li> </ul> |
| 7 Combining shoe-leather epidemiology with WGS to  | <ul style="list-style-type: none"> <li>▪ To further the understanding of CP-CRE transmission by linking WGS data from CP-CRE</li> </ul>  |

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| <p>model and predict CP-CRE transmission dynamics</p>   | <p>isolates with the spatiotemporal movement of patients to enable modeling of CP-CRE transmissions within healthcare setting. This will allow the following specific aims to be achieved:</p> <ol style="list-style-type: none"> <li>i. Infect the likely transmission routes and hidden sources of CP-CRE transmission</li> <li>ii. Reveal the complex transmission network by which the CP-CRE isolates travel in healthcare settings</li> <li>iii. Evaluate high risk spatiotemporal patterns (including contaminated area and healthcare processes) that may potentially contribute to the spread of CP-CRE</li> <li>iv. Evidence-based suggestions to improve infection control measures in the healthcare setting</li> </ol>   |
| <p>8 Health systems and behavioral science (HSBS) research to address the drivers of AMR in hospitals</p> | <ul style="list-style-type: none"> <li>▪ To systematically review the existing literature on all aspects within the health-system related to tackling AMR adopting a multidisciplinary approach</li> <li>▪ To review existing policies, programmes and structures in place that address AMR</li> <li>▪ To examine the motivations, social constructs, contextual drives and power relations of policy actors that influence behaviors and decision-making processes in developing policies for AMR, specifically in relation to the appropriate use of antimicrobials</li> <li>▪ To identify the gaps that currently exist in the areas of surveillance, access to, and stewardship of antimicrobials at all levels of the health system</li> <li>▪ To understand the role of hospital-based interventions in curbing AMR</li> <li>▪ To assess comprehensively the health systems barriers and facilitators (including but not limited to surveillance, stewardship and infection prevention and control) to address AMR in Singapore hospitals</li> <li>▪ To develop conceptual frameworks and tools for health systems that will enable international comparisons and establish solutions for AMR in Singapore</li> <li>▪ To develop strategies and tools for working with policy makers to effectively implement policies for the responsible use of antimicrobials</li> </ul> |