

Annex A**PRIORITY THEMES FOR CD-PHRG GRANT APPLICATIONS IN NOV-DEC 2014**

S/N	CD-PHRG Nov-Dec 2014 Priority Themes
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2	Prevention and Control of Antimicrobial Resistance
3	Prevention and Control of Hospital Acquired Infections
4	Tuberculosis (TB) control
5	Behaviour and Transmission of Human Immunodeficiency Virus (HIV) and Other Sexually Transmitted Infections (STIs)
6	Improving Vaccination Strategies
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Annex A1

PRIORITY THEMES FOR CD-PHRG GRANT APPLICATIONS IN NOV-DEC 2014

1. Health Systems Resilience to Dangerous and Epidemic Infectious Diseases

A good health system is important to protect a nation's public health and provide timely information to inform public health actions for the prevention of infectious diseases. A well functioning health system responds in a balanced way to a population's needs and expectations by:

- improving the health status of individuals, families and communities
- defending the population against what threatens its health
- protecting people against the financial consequences of ill-health
- providing equitable access to people-centred care¹

With the ever changing patterns of emerging infectious diseases and increased global connectivity, the current health system needs to be enhanced for improved patient health outcomes. These include strengthening preparedness measures against the importation of infectious diseases and pandemics, improving access to healthcare as well as improving care and treatment strategies to prevent against infectious diseases.

Pandemic preparedness involves many aspects, including disease surveillance, case management, command and control, and community containment. The impact of a pandemic is substantial in terms of morbidity, mortality and economic cost. There is also potential for serious social disruption. Improving pandemic planning and preparedness is therefore crucial to mitigate its impact on the population. Earlier studies on the completeness of national pandemic preparedness plans in several regions, however, reveal that many challenges and important gaps in preparedness remain and the level of preparedness varies hugely across and within regions. It would be seemingly important to address these challenges and gaps altogether with better preparedness strategies and improved operational capability.

CD-PHRG projects should translate into public health measures or strategies to improve the current health systems, including the preparedness response framework against pandemics and the importation of infectious diseases.

Goals could include:

- Identify gaps in current health systems for the prevention of infectious diseases
- Enhance health systems capacity for infectious diseases
- Strengthen preparedness measures to prevent the importation of infectious diseases and against pandemics
- Improve health outcomes of the population i.e. reducing morbidity and mortality rates
- Identify gaps in current pandemic preparedness response capability
- Improve overall pandemic planning and preparedness – this would include methodological studies to determine when is the most appropriate time to switch to the different stages of pandemic preparedness
- Improve how information (through multi-source surveillance) informs practice

- Develop novel methods of infectious diseases surveillance
- Enhance health systems capacity for pandemic preparedness
- Strengthen population resilience in pandemic scenarios
- Evaluate cost-effectiveness of different preparedness plans
- Evaluate the effectiveness of different strategies to manage pandemics
- Evaluate and reduce the economic burden of infectious diseases with pandemic potential
- Clinical research in the context of epidemics and public health emergencies

2. Prevention and Control of Antimicrobial Resistance

Antimicrobial drug resistance (AMR) is an important emerging public health problem around the world. AMR is often the result of inappropriate and immoderate prescription of antimicrobial agents in clinical practice; implementation failure of infection control practices in institutional settings; excessive use of antimicrobial agents in animal husbandry; and globalisation with ease of travel or transport of both humans and livestock.ⁱⁱ

CD-PHRG projects on prevention and control of AMR should translate into measures, strategies and relevant policies to combat AMR.

Goals could include:

- Prevent nosocomial transmission of resistant strains Reduce endemic AMR – in particular improve on surveillance methods
- Determine the impact of AMR on patient health outcomes
- Evaluate cost-effectiveness of interventions used for control of AMR
- Evaluate surveillance and antimicrobial stewardship programmes
- Assess antimicrobial use/misuse from community/ primary care clinical setting through in/out-patients in hospital to ITUs,
- Develop and implement interventions to reduce AMR
- Pharmacokinetic/Pharmacodynamic linked with clinical studies designed to improve use of antimicrobial agents
- Better and faster methods to detect new and important antibiotic resistance determinants
- Novel methods to assess drug resistance in malarial parasites

3. Prevention and Control of Hospital Acquired Infections

CD-PHRG projects should translate into measures or strategies for reducing transmission and preventing HAIs.

Goals could include:

- Improve understanding of factors contributing to HAIs – development of validated local risk factor profiles which can be allowed to risk stratify patients for surveillance for HAIs

- Identify gaps in current interventions for preventing HAIs including surveillance tools for HAIs in Singapore hospitals
- Improve interventions for preventing HAIs
- Develop novel technologies for the prevention of device associated infections – this will not include bioengineering approaches which can be funded from alternative sources but would rather focus on clinical trials of implementation of novel technologies
- Evaluate interventions for preventing HAIs – this includes cost-effectiveness analyses of interventions that are currently in place
- Reduce nosocomial infections overall

4. Tuberculosis control

Drug-resistant TB is of increasing concern. Nearly 500,000 new cases of multidrug-resistant (MDR) TB are diagnosed each year, and some countries have proportions of MDR TB as high as 20%.ⁱⁱ MDR and XDR (extensively drug-resistant) TB are of particular concern among HIV-infected or other immunocompromised people.

CD-PHRG projects on tuberculosis control should translate into measures, strategies and relevant policies to guide the control of tuberculosis.

Goals could include:

- Promote TB control measures/programmes
- Enhance adherence to treatment
- Improve management of TB through Pharmacokinetic/Pharmacodynamic work linked with clinical studies to improve treatment and reduce transmission and resistance
- Studies to investigate the use of imaging or other modalities to assess clinical response to treatment
- Epidemiological, genotyping and mapping studies to determine routes of transmission in Singapore
- Improve on patient health outcomes
- Reduce TB incidence
- Reduce MDR TB and XDR TB
- Enhance surveillance programmes and outcomes monitoring

5. Behaviour and Transmission of Human Immunodeficiency Virus and Other Sexually Transmitted Infections

CD-PHRG projects on behaviour and transmission of HIV and other STIs should translate into behavioural interventions aimed at reducing high risk sexual behaviour and preventing HIV infection and other STIs.

Goals could include:

- Determine the factors affecting the behaviour and transmission of HIV and other STIs in particular among casual sex workers in Singapore but also other groups
- Interventions to reduce high risk sexual behaviour
- Prevent transmission of HIV and other STIs using new or existing approaches including microbicides, circumcision, or other interventions
- Improve patient health outcomes

6. Improving Vaccination Strategies

While major progress has been made in the fight against vaccine-preventable diseases, gaps in vaccination uptake rates show that immunisation strengthening at the population level remains vital. Optimal protection requires uptake rates as high as 95%.ⁱⁱⁱ Main barriers to achieving high vaccination rates are multi-factorial. Some of the most common barriers to vaccination include the lack of awareness and education about vaccines and vaccine-preventable diseases, access and delivery issues, costs, financial concerns, and the attitudes of adolescents, parents, and providers toward vaccination.

CD-PHRG projects should translate into developing effective measures and improving vaccination strategies for overcoming barriers and improving uptake of vaccines to reduce vaccine-preventable diseases.

Goals could include:

- Identify barriers to vaccination
- Improve uptake of vaccines using novel approaches (e.g. improving community coverage)
- Evaluate the impact of vaccination on patient health outcomes (e.g. reduction in disease incidence, reduction in hospitalisations)
- Evaluate the impact of vaccination strategies on overall health outcomes
- Evaluate the cost-effectiveness of vaccination strategies
- Determine and/or evaluate the most effective vaccination strategy in Singapore
- Evaluate the impact of pneumococcal vaccination on serotype switch

7. New Approaches to Improve the Detection and Surveillance of Novel Infections of Public Health Importance

Novel infections or naturally emerging pathogens of public health importance demand new diagnostic approaches to facilitate their early recognition and detection and to enhance better surveillance, containment and management of pathogen induced-diseases. These can include both laboratory and non-laboratory-based methods for detection and surveillance. New laboratory diagnostic methods such as rapid molecular tests and multiplex serological tests with high sensitivity and specificity have enhanced the capabilities of laboratories to identify and characterise microbial

pathogens in greater detail, to improve surveillance of novel infections and develop appropriate interventions for disease control. Sophisticated new amplification–detection combinations are resulting in many applications in laboratory testing for infectious diseases. These applications include qualitative detection, sub-species-level DNA fingerprinting, molecular resistance testing and genotyping, and quantitative (viral load) testing.^{iv}

In addition, there is a need for innovative surveillance methods to enhance the early detection, analysis and monitoring of outbreaks occurring in real time, to initiate a rapid response to outbreaks. One example would be syndromic surveillance which focuses on the early symptom (prodrome) period before clinical or laboratory confirmation of a particular disease and integrates both clinical and alternative data sources to inform investigators of emerging outbreaks.^v

CD-PHRG projects should translate into developing new diagnostic approaches and/or methods to improve the detection and surveillance of novel infections or pathogens of public health importance. This project is NOT meant for developing diagnostic kits and devices at an early stage or to support commercialisation of kits; these are already supported by other grants.

Goals could include:

- Experimental approaches to detect novel pathogens causing severe disease, including random priming and deep-sequencing applications
- Developing and testing a programme for tissue culture of viruses which can detect new agents or strains
- Develop a syndromic surveillance system/ method for the early detection and surveillance of novel infections of public health importance
- Develop a new diagnostic approach to detect, evaluate and report emerging outbreaks prior to laboratory-confirmation of cases
- Prototype rapid development of antibody or antigen based tests for novel infections of public health importance and demonstrate usefulness in infectious diseases surveillance

8. Dengue Prevention and Control

CD-PHRG projects on dengue prevention and control should translate into strategies and measures to improve dengue surveillance, prevention and control of dengue transmission and improve clinical management of dengue cases.

Goals could include:

- Develop novel technologies or methods for early detection of dengue
- Develop novel and scalable tools/ technologies/ methods to enhance vector control and prevent/reduce dengue transmission/incidence

- Improve dengue surveillance methods
- Develop a resource-optimised model for inpatient and outpatient management of dengue
- Improve overall management for dengue cases to reduce disease burden
- Dengue vaccine research and evaluation
- Dengue therapeutics research and evaluation

9. Infections in Special Populations

- a) Infants and Young Children
- b) Elderly
- c) Migrants and/or Travellers

Infections can occur frequently in special or at risk populations such as infants and young children, elderly persons, migrants and/or travellers. These persons are more susceptible to infections due to age, immunity, travel and exposure. Respiratory tract infections including seasonal influenza and pneumococcal disease can occur throughout life, but very young children and the elderly are at highest risk for severe complications and associated morbidity and mortality.^{vi; vii}

Infections can also be imported and/or transmitted within and between countries by incoming migrants and/or visiting or returning travellers. Increased travel and exposure have enhanced the opportunities for disease spread among the population and across international borders. These include infectious diseases such as tuberculosis, HIV, measles, poliovirus, severe acute respiratory syndrome (SARS) in 2003, influenza A (H1N1) infection in 2009, as well as the recent Middle East Respiratory Syndrome Coronavirus (MERS-CoV) and the Ebola outbreak in West African region.

CD-PHRG projects on infections in special populations should translate into strategies and measures to prevent and control the development and spread of infections in these special populations and improve clinical management to reduce associated morbidity and mortality.

Goals could include:

- Strengthen infectious diseases surveillance, laboratory detection, and epidemiologic investigation among the special populations^{viii}
- Develop measures to prevent, detect, and control infections in the special populations to prevent further disease transmission and progression
- Improve interventions for prevention of infections among the special populations
- Evaluate interventions for preventing infections among the special populations – this includes cost-effectiveness analyses of interventions that are currently in place
- Reduce overall infections among the special populations
- Reduce infection associated morbidity and mortality among the special populations

10. Prevention and Control of Foodborne and Zoonotic Diseases

Foodborne and zoonotic diseases are a significant and widespread global public health problem. Each year, foodborne pathogens cause significant illnesses,

hospitalisations, and deaths. Most of the pathogens that play a role in foodborne diseases have a zoonotic origin. It is estimated that about 75% of emerging infections are from zoonotic origins, i.e. they emerge from animal populations to infect and then spread among humans.^{viii} Examples include Ebola virus, H5N1 and H1N1 influenza viruses, and the SARS coronavirus. The development of antimicrobial resistance also poses an increasing burden on health care systems in the treatment of some zoonotic diseases.

Foodborne and zoonotic diseases require multi-disciplinary partnerships and innovative approaches for the prevention and control of these infections. Globally, efforts are being directed toward expanding surveillance networks and enhancing epidemiologic and laboratory tools for detecting and investigating outbreaks and identifying sources of foodborne illnesses. Improved diagnostics are also essential for the early detection of zoonotic diseases in humans and animals to expedite the delivery of treatment and prevention interventions.^{ix}

CD-PHRG projects on foodborne and zoonotic diseases should translate into strategies and measures to improve diagnostics, surveillance, prevention and control of foodborne and zoonotic diseases and clinical management of such cases.

Goals could include:

- Develop innovative surveillance methods to enhance the early detection, analysis and monitoring of outbreaks occurring in real time, to initiate a rapid response to outbreaks
- Improve understanding of the mechanism by which contamination and disease transmission occur to develop prevention or control measures
- Improve diagnostics to facilitate the early detection of zoonotic diseases
- Develop novel and scalable tools/ technologies/ methods to enhance control and prevent/reduce zoonotic transmission/incidence
- Conduct research and evaluation of therapeutics/vaccines
- Reduce foodborne and/or zoonotic diseases associated illnesses, hospitalisations and deaths

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