MINISTRY OF HEALTH
SINGAPORE

Guide for Communicable Diseases Public Health Research Grant (CD-PHRG) Application

Eligibility

- Only **one** Principal Investigator (PI) is allowed per application. The PI shall be the point of contact for MOH, with the stated Department and Institution as the Host Institution (for administrative and finance matters). Applicants with multiple appointments at different institutions are to select only **one** Host Institution for the application.

- PI for CD-PHRG should possess a minimum academic qualification of **PhD and/or MBBS/BDS/ PharmD/MD and/or other appropriate Postgraduate Qualification**. In particular,

  (a) PI should have at least one first-author publication, and
  (b) For non-clinicians, applicant should have at least 2 years research experience; or
  (c) For clinicians, applicant should be at least a Registrar or Associate Consultant (or equivalent);

- In addition, PI should fulfill the following requirements:

  (a) hold at least an adjunct position in a local public institution and salaried by the institution; and
  (b) have access to a laboratory/ research facility to conduct research in Singapore; and
  (c) reside in Singapore.

  Applicant has to provide justifications and allocation of time spent in Singapore if the above are not met. Exceptions will be evaluated by the panel on a case-by-case basis.

General Instructions

- Please prepare your application using the templates available on the nGager online submission system and upload these documents to the relevant sections in nGager:
  (i) Research proposal
  (ii) CV template (PI, Co-Investigator / Collaborator, Mentor)
  (iii) Research team signatories' template
  (iv) Other supporting details

- Any softcopy document must be uploaded to nGager as 1 file at each uploading tab either in Word DOC or PDF format (please do not submit scanned PDF format except for signatories). Please adhere to the number of pages where specified and reformat softcopies such that all blank or irrelevant pages are removed.

- All applicants are required to complete the grant submission using the nGager online submission system.

- Please complete all sections in the nGager and indicate "NA" where a particular section is not applicable.

- Once you have completed your application form in nGager, please download the form in PDF format for your reference.

- Resubmission refers to proposals resubmitted after earlier unsuccessful application(s). It is not a re-written proposal from a new perspective. If more than 50% of the proposal is to be revised, it should be submitted as a new application. **Please note that resubmission attempts are capped at two times.**

- In any single grant call, each PI is allowed to submit one application per grant type.

- There is no limit to the number of Co-Investigators or collaborators. However, please note that **Co-Investigators need to hold at least an adjunct position in a local public institution.** Researchers from overseas institutions or private companies can only participate as collaborators. The terms of collaboration with overseas research institutions and private companies must conform to NMRC's existing policies. **Please specify and describe clearly the roles of Co-Investigators and collaborators in the relevant section.**

- Include CVs of the PI, Co-Investigator(s), and Collaborators with the email addresses and contact information clearly stated. **PI's CV is limited to 2 pages. Co-Investigators and Collaborators' CV is limited to 1 page.**

- CD-PHRG Budget is capped at S**$1M** inclusive of indirect research costs (capped at 20% of eligible funding amount). Refer and adhere to the **budgeting requirements**. Provide a breakdown for all categories with justifications and supporting documents such as quotations (if available) for all purchases. Tally and provide both a **subtotal amount** for each category and the **total amount** budgeted.

- The project will be awarded for a period of up to 3 years; Researchers who need to apply for extension at the end of the three years may do so, but for up to a maximum of one-year extension only and without any additional funding. Funding beyond the first year will be contingent upon review and acceptance by MOH of the progress report.

- Use **Arial font size 10** for all attachment/ text.

- Plagiarism (ie. copying without permission from author or reference made to source) will be referred to Host Institution for investigation and may be subjected to disciplinary actions.

  - Refer to Appendix 2 for details on Health Research Classification System (HRCS) to complete "Field of Research" in nGager.

  - Refer and adhere to the MOH/NMRC financial guidelines and list of non-fundable items. More details in Appendix 3.

  - Refer to Appendix 4 for checklist on Study Design and Statistical Considerations to complete "Methods/Approach" section in the research proposal.

Additional documents required for Re-submission Applications

- Resubmission refers to proposals resubmitted after earlier unsuccessful application(s). It is not a re-written proposal from a new perspective. If more than 50% of the proposal is to be revised, it should be submitted as a new application.

- A proposal can only be resubmitted **two times**. Proposal which has been resubmitted for more than two times will be rejected.

- Append reviewers' reports/ comments of the previous unsuccessful application(s), and any other relevant information, as one document, in the relevant section.

- On a separate document, **itemize how the revised proposal** (i.e. re-submission application) has addressed past reviewers' comments, and **highlight new features or merits** of the revised proposal.

Additional documents required for Renewal Applications (follow up study from previous MOH projects)

- Submit a progress/final report of the existing project to indicate the progress and outputs of the project in the prescribed reporting format (i.e. progress/ final report).

- As this section may be submitted to both overseas and local reviewers, PI is to ensure that all sensitive information on IP issues and such are cleared from the Host Institution before submitting to MOH.

Submission of application

- It is **mandatory** for all applications to be submitted online via nGager by the stipulated closing dates for each grant call. Please refer to the CD-PHRG webpage for the latest grant call closing dates: http://www.moh.gov.sg/content/moh_web/home/Fundings_and_Medical_Research/communicable_diseasespublichealthresearchgrant.html

- Each Host Institution's Research Office should check their corresponding PI's application for completeness. All proposals should also be endorsed by the Host Institution's Research Office.

- We reserve the right to not entertain any late submissions, incomplete applications, or submissions from individual applicants without Host Institution's endorsement.

- Submit **your application via the** NMRC Grant Application and Grant Evaluation for Research (nGager) online system, The nGager User Guide can be found at this website: http://www.nmrc.gov.sg/content/nmrc_internet/home/ngager.html for

Appendix 1

Communicable Diseases Public Health Research Grant Priority Topics/ Themes and Codes (Nov-Dec 2014)

The Communicable Diseases Public Health Research Grant Priority Topics/ Themes (CD-PHRG) are strategic areas of interests specified by MOH. These topics focus on the area of communicable diseases prevention and control, with major public health (PH) impact for Singapore.

Topics that fall outside the scope of the priority themes/topics listed below will be classified under the code 13.99 (Others). In such circumstances, PIs are to justify, within the "Research Proposal", their proposed topic/theme in terms of relevance and importance to the area of communicable diseases prevention and control and how the research would contribute towards public health risk assessment, interventions and policy formulation for communicable diseases control. Note that priority of award is given to proposals relevant to the list of priority topics/ themes.

For detailed descriptions on the CD-PHRG grant topics, please refer to Annex A.

Code	Topic/ Theme
13.01	Health Systems Resilience to Dangerous and Epidemic Infectious Diseases
13.02	Prevention and Control of Antimicrobial Resistance
13.03	Prevention and Control of Hospital Acquired Infections
13.04	Tuberculosis (TB) control
13.05	Behaviour and Transmission of Human Immunodeficiency Virus (HIV) and Other Sexually Transmitted Infections (STIs)
13.06	Improving Vaccination Strategies
13.07	New Approaches to Improve Detection and Surveillance of Novel Infections of Public Health Importance
13.08	Dengue Prevention and Control
13.09	Infections in Special Populations: a) Infants and Young Children b) Elderly c) Migrants and/or Travellers
13.10	Prevention and Control of Foodborne and Zoonotic Diseases
13.99	Others

HEALTH RESEARCH CLASSIFICATION SYSTEM

The Health Research Classification System is a bespoke system for classifying the full spectrum of biomedical and health research - from basic to applied - across all areas of health and disease. It was developed by the UK Clinical Research Collaboration Partners. It is supported by an online reference source and manual - http://www.hrcsonline.net/".

Health Categories

Category	Includes
Blood	Haematological diseases, anaemia, clotting and normal development and function of platelets and erythrocytes
Cancer	All types of cancers (includes leukaemia)
Cardiovascular	Coronary heart disease, diseases of the vasculature and circulation including the lymphatic system, and normal development and function of the cardiovascular system
Congenital Disorders	Physical abnormalities and syndromes that are not associated with a single type of disease or condition including Down's syndrome and cystic fibrosis
Ear	Deafness and normal ear development and function
Eye	Diseases of the eye and normal eye development and function
Infection	Diseases caused by pathogens, acquired immune deficiency syndrome, sexually transmitted infections and studies of infection and infectious agents
Inflammatory and Immune System	Rheumatoid arthritis, connective tissue diseases, autoimmune diseases, allergies and normal development and function of the immune system
Injuries and Accidents	Fractures, poisoning and burns
Mental Health	Depression, schizophrenia, psychosis and personality disorders, addiction, suicide, anxiety, eating disorders, learning disabilities, autistic spectrum disorders and studies of normal psychology, cognitive function and behaviour
Metabolic and Endocrine	Diabetes, thyroid disease, metabolic disorders and normal metabolism and endocrine development and function
Musculoskeletal	Osteoporosis, osteoarthritis, muscular and skeletal disorders and normal musculoskeletal and cartilage development and function
Neurological	Dementias, transmissible spongiform encephalopathies, Parkinson's disease, neurodegenerative diseases, Alzheimer's disease, epilepsy, multiple sclerosis and studies of the normal brain and nervous system
Oral and Gastrointestinal	Inflammatory bowel disease, Crohn's disease, diseases of the mouth, teeth, oesophagus, digestive system including liver and colon, and normal oral and gastrointestinal development and function
Renal and Urogenital	Kidney disease, pelvic inflammatory disease, renal and genital disorders, and normal development and function of male and female renal and urogenital system
Reproductive Health and Childbirth	Fertility, contraception, abortion, *in vitro* fertilisation, pregnancy, mammary gland development, menstruation and menopause, breast feeding, antenatal care, childbirth and complications of newborns
Respiratory	Asthma, chronic obstructive pulmonary disease, respiratory diseases and normal development and function of the respiratory system
Skin	Dermatological conditions and normal skin development and function
Stroke	Ischaemic and haemorrhagic
Generic Health Relevance	Research applicable to all diseases and conditions or to general health and well-being of individuals. Public health research, epidemiology and health services research that is not focused on specific conditions. Underpinning biological, psychosocial, economic or methodological studies that are not specific to individual diseases or conditions
Other	Conditions of unknown or disputed aetiology (such as chronic fatigue syndrome, myalgic encephalomyelitis), or research that is not of generic health relevance and not applicable to specific health categories listed above

Overview of the Research Activity Codes

1	**Underpinning Research**
1.1	Normal biological development and functioning
1.2	Psychological and socioeconomic process
1.3	Chemical and physical sciences
1.4	Methodologies and measurements
1.5	Resources and infrastructure (underpinning)
2	**Aetiology**
2.1	Biological and endogenous factors
2.2	Factors relating to physical environmental
2.3	Psychological, social and economic factors
2.4	Surveillance and distribution
2.5	Research design and methodologies
2.6	Resources and infrastructure
3	**Prevention of Disease and Conditions, and Promotion of Well-Being**
3.1	Primary prevention interventions to modify behaviours or promote well-being
3.2	Interventions to alter physical and biological environmental risks
3.3	Nutrition and chemoprevention
3.4	Vaccines
3.5	Resources and infrastructure (prevention)
4	**Detection, Screening and Diagnosis**
4.1	Discovery and preclinical testing of markers and technologies
4.2	Evaluation of markers and technologies
4.3	Influences and impact
4.4	Population screening
4.5	Resources and infrastructure (detection)
5	**Development of Treatments and Therapeutic Interventions**
5.1	Pharmaceuticals
5.2	Cellular and gene therapies
5.3	Medical devices
5.4	Surgery
5.5	Radiotherapy
5.6	Psychological and behavioural
5.7	Physical
5.8	Complementary
5.9	Resources and infrastructure (development of treatments)
6	**Evaluation of Treatments and Therapeutic Interventions**
6.1	Pharmaceuticals
6.2	Cellular and gene therapies
6.3	Medical services
6.4	Surgery
6.5	Radiotherapy
6.6	Psychological and behavioural
6.7	Physical
6.8	Complementary
6.9	Resources and infrastructure (evaluation of treatments)
7	**Management of Diseases and Condition**
7.1	Individual care needs
7.2	End of life care
7.3	Management and decision making
7.4	Resources and infrastructure (disease management)
8	**Health and Social Care Services Research**
8.1	Organisation and delivery of services
8.2	Health and welfare economics
8.3	Policy, ethics and research governance
8.4	Research design and methodologies
8.5	Resources and infrastructure (health services)

Research Activity Codes

1. Underpinning Research	**Research that underpins investigations into the cause, development, direction, treatment and management of diseases, conditions and ill health**
1.1 Normal biological development and functioning	Studies of normal biology including - genes and gene products - molecular, cellular and physiological structures and function - biological pathways and processes including normal immune function - developmental studies and normal ageing - bioinformatics and structural studies - development and characterisation of model systems
1.2 Psychological and socioeconomic process	Studies that do not address health directly but cover issues that may have a bearing on health and well-being including - perception, cognition and learning processes - social and cultural beliefs - individual or group characteristics and behaviours - politics, economies and urban development - development and characterisation of model systems
1.3 Chemical and physical sciences	Research in chemical and physical sciences that may lead to the future development of diagnostic tools or medical treatments including - bioengineering and biophysics - chemical structures, interactions and properties - molecular modelling - material science
1.4 Methodologies and measurement	Development of novel underpinning research measures and analytical methodologies including - development of statistical methods and algorithms for genomic analysis - development of mapping methodologies and novel data comparison methods - development of biological, psychological and socioeconomic research measures
1.5 Resources and infrastructure (underpinning)	- development and/or distribution of resources for use by the research community including equipment, cell lines, DNA banks, and genomic and proteomic sequence resources - infrastructure to support research networks, consortia and centres

Research Activity Codes

2 Aetiology	**Identification of determinants that are involved in the cause, risk or development of disease, conditions and ill health**
2.1 Biological and endogenous factors	Identification and characterisation of endogenous factors known or suspected to be involved in the cause, risk or development of disease, conditions or ill health including • genes and gene products, molecular, cellular and physiological structures and functions • biological factors linked to ethnicity, age, gender, pregnancy and body weight • endogenous biological factors or pathways involved in responses to infection or damage by external factors • metastases, degenerative processes, regeneration and repair • complications, reoccurrence and secondary conditions • bioinformatics and structural studies • development and characterisation of models
2.2 Factors relating to physical environment	Environmental or external factors associated with the cause, risk or development of disease, conditions or ill health including • physical agents, occupational hazards, environmental surroundings, radiation and pollution • chemicals and nutrients • infection by pathogens and studies of infectious agents
2.3 Psychological, social and economic factors	Research into psychological conditions, or research into the cause, risk or development of disease, conditions or ill health associated with social, psychological and economic factors including • individual or group behaviours and lifestyle • cultural or religious beliefs or practices • ethnicity, age and gender differences • socioeconomic factors
2.4 Surveillance and distribution	Observational studies, surveys, registries. and studies that track incidence, prevalence, morbidity, co-morbidity and mortality including ongoing monitoring of large scale cohorts
2.5 Research design and methodologies (aetiology)	Development of aetiological and epidemiological research designs, measures and methodologies including • methodological innovation and modelling complex epidemiological data • development and evaluation of novel research designs • development of epidemiological research measurements including outcome measures • development of analytical and statistical methods to understand disease cause, susceptibility and risk including genetic linkage and association studies
2.6 Resources and infrastructure (aetiology)	• development and/or distribution of resources for general use by the research community including equipment, cell lines, tissue and DNA banks, and genomic and proteomic sequence resources • infrastructure to support research networks, consortia and centres

Research Activity Codes

3 Prevention of Disease and Conditions, and Promotion of Well-Being	**Research aimed at the primary prevention of disease, conditions or ill health, or promotion of well-being**
3.1 Primary prevention interventions to modify behaviours or promote well-being	Development, implementation and evaluation of interventions to modify personal or group behaviours and lifestyles affecting health and well-being including - risk behaviours associated with diet, tobacco use, physical activity, alcohol consumption, sexual health and substance misuse - age, gender, cultural or religious practices - public health policy, health communication and educational interventions - behavioural, psychological, social and physical interventions
3.2 Interventions to alter physical and biological environmental risks	Development, implementation and evaluation of interventions surrounding physical, biological and environmental risk factors including - radiation, second-hand smoke, physical and chemical agents, - occupational hazards and environmental surroundings - contraceptive devices - infectious agents - policy, educational and physical interventions
3.3 Nutrition and chemoprevention	Research on chemo-preventative agents and health protective effects of nutrients including - development, characterisation and mechanism of action - chemical contraceptives - testing and evaluation in model systems and clinical, applied and community settings - evaluation of evidence to inform policy
3.4 Vaccines	Research on vaccines for prevention of disease including - discovery, development and testing of vaccines and vaccination in model systems - mechanism of action - development, implementation and evaluation of vaccination programmes and studies to increase uptake - decision making, outcomes from vaccination and evaluation of evidence to inform policy
3.5 Resources and infrastructure (prevention)	- development and/or distribution of resources for use by the research community including equipment, ceil lines, tissue and DNA banks - infrastructure to support research trials, networks, consortia and centres

Research Activity Codes

4 **Detection, Screening and Diagnosis**	**Discovery, development and evaluation of diagnostic, prognostic and predictive markers and technologies**
4.1 Discovery and preclinical testing of markers and technologies	Discovery, development and preclinical testing of novel markers (that may be derived from patient samples) and technologies for use in detection, diagnosis, prediction, prognosis and monitoring including - biological and psychological markers - diagnostic and monitoring devices, imaging, scanning, predictive and - diagnostic tests - development and characterisation of models - diagnostic measures and methodologies
4.2 Evaluation of markers and technologies	Testing and evaluation of markers and technologies in humans for use in detection, diagnosis, prediction, prognosis and monitoring in clinical, community or applied settings including - assessment of sensitivity, efficacy, specificity. predictive and prognostic value, reproducibility and safety - medical devices, imaging, diagnostic and predictive tests - evaluation of diagnostic models, methods and methodologies in clinical or applied settings
4.3 Influences and impact	Studies investigating impact of screening and factors affecting uptake including - attitudes and beliefs including cultural and religious practices - issues relating to gender, age and ethnicity - genetic counselling and decision making - psychological, social and economic factors - development, implementation and evaluation of interventions to promote screening including policy, education and communication
4.4 Population screening	Studies investigating population screening programmes including - feasibility studies, pilot studies and trials - evaluation of effectiveness, benefits and economic evaluation - impact on health services and policy issues - models of population surveillance
4.5 Resources and infrastructure (detection)	- development and/or distribution of resources for use by the research community including equipment, cell lines, tissue and DNA banks, and informatics systems - infrastructure support for research trials, networks, consortia and centres

Research Activity Codes

5 Development of Treatments and Therapeutic Interventions	Discovery and development of therapeutic interventions and testing in model systems and preclinical settings
5.1 Pharmaceuticals	Identification and development of pharmaceutical small molecules, therapeutic vaccines, antibodies and hormones including - drug screening and development of delivery systems - mechanism of action including side effects and drug resistance - pharmacogenetics, prediction of genetic variation and responses to drugs - testing in in vitro and in vivo model systems
5.2 Cellular and gene therapies	Discovery and development of cellular, tissue and gene therapies including - gene therapy, stem cells therapy, in vitro fertilisation and tissue engineering - development of delivery systems - development of culture systems - testing in in vitro and in vivo model systems
5.3 Medical devices	Discovery and development of medical devices including - implantable devices, mobility aids, dressings, medical equipment and prostheses - biological safety assessments and investigation of adverse events - sterilisation and decontamination of equipment or surfaces - testing in in vitro and in vivo model systems
5.4 Surgery	Development of surgical, obstetric and dental interventions including - histocompatibility, transfusions, transplantations including xenograft studies and bone marrow transplants - mechanisms of recovery, tolerance, rejection and side effects including infection - testing in in vitro and in vivo model systems
5.5 Radiotherapy	Discovery and development of interventions including - radiobiology, radiotherapy, radioimmunotherapy, radiosensitisers, microwaves, ultrasound, laser and phototherapy - development of delivery systems - investigation of mechanisms of action and side effects - testing in in vitro and in vivo model systems
5.6 Psychological and behavioural	Development of psychological and behavioural interventions including - cognitive behavioural therapy, electro-convulsive therapy, counselling, therapy and social interventions - testing in model systems
5.7 Physical	Development of physical interventions including - physical therapies, physiotherapy, occupational therapy, speech therapy, dietetics, exercise and osteopathy - mechanisms of action - testing in model systems
5.8 Complementary	Discovery and development of complementary approaches to conventional medical therapies including - hypnotherapy, meditation, massage, acupuncture and homeopathy - mechanisms of action - testing in model systems
5.9 Resources and infrastructure (development of treatments)	- development and/or distribution of resources for general use by the research community including equipment, cell lines, tissue and DNA banks - infrastructure support for networks, consortia and centres

Research Activity Codes

6 Evaluation of Treatments and Therapeutic Interventions	Testing and evaluation of therapeutic interventions in clinical community or applied settings
6.1 Pharmaceuticals	Clinical application and evaluation of pharmaceutical small molecules, therapeutic vaccines, antibodies and hormones in humans including - small scale settings and pilot studies - phase I, II, III and IV trials - assessing sensitivity, efficacy, specificity, relapse, survival, therapeutic value, pharmacokinetics, reproducibility and safety - studies monitoring response, outcome, drug resistance and side effects
6.2 Cellular and gene therapies	Clinical application and evaluation of cellular, tissue and gene therapies in humans including - small scale and pilot studies - phase I, II, III and IV trials - gene therapy, stem cell therapy, in vitro fertilisation, tissue engineering - evaluation of applied delivery systems
6.3 Medical devices	Application and evaluation of medical devices in humans in a clinical, community or applied setting including - implantable devices, mobility aids, dressings, medical equipment and prostheses - validation of design and post market surveillance
6.4 Surgery	Clinical and applied application and evaluation of surgical, obstetric and dental interventions in humans including - small scale and pilot studies - phase I, II, III and IV trials - procedures including organ and bone marrow transplantation, tissue grafts and transfusions - monitoring outcomes, side effects and rejection
6.5 Radiotherapy	Clinical application and evaluation of interventions in humans including - small scale and pilot studies - phase I, II, III and IV trials - radiotherapy, radioimmunotherapy and radiosensitisers, microwaves, ultrasound, laser and phototherapy - monitoring side effects
6.6 Psychological and behavioural	Application and evaluation of psychological and behavioural interventions in humans in clinical, community and applied settings - phase I, II, III and IV trials - cognitive behavioural therapy, electro-convulsive therapy, counselling, therapy and social interventions
6.7 Physical	Testing and evaluation of physical interventions in humans in a clinical, community or applied setting including - physical therapies, physiotherapy, occupational therapy, speech therapy, dietetics, osteopathy and exercise
6.8 Complementary	All aspects of testing, evaluation and provision of complementary approaches to conventional medicine in humans in a clinical, community or applied setting including - hypnotherapy, massage, acupuncture and homeopathy

	- issues relating to health and social services and health care delivery - attitudes and beliefs of patients and health care professionals
6.9 Resources and infrastructure (evaluation of treatments)	- provision and distribution of resources related to clinical and applied therapeutic interventions - infrastructure support for clinical and applied research networks and trials, consortia and centres

Research Activity Codes

7 Management of Diseases and Condition	Research into individual care needs and management of disease, conditions or ill health
7.1 Individual care needs	Studies of patients and service user care needs including - quality of life, management of acute and chronic symptoms, management of side effects, rehabilitation, long term morbidity and reproductive issues - psychological impact of illness - social and economic consequences of ill health - behaviour affecting disease management including secondary prevention, compliance to treatment and attitudes and beliefs relating to seeking treatment - assessment of social care and health services needs - educational or communication interventions to promote self-care or improve health care by carers - impact on carers
7.2 End of life care	Studies involving all issues related to palliative care and end of life care including - assessment of patient, service user and carer needs - provision and evaluation of palliative and end of life care services - quality of life for patients and carers - evaluation of interventions for health and social care professionals - social, economic and policy issues - pain management for terminally ill people - bereavement
7.3 Management and decision making	Studies into all aspects of the management of diseases, ill health and conditions by health and social care professionals - attitudes, beliefs and behaviours of health and social care professionals - investigation of decision making including factors influencing diagnosis, treatment, referral and management strategies - educational interventions and communication practices - development of guidelines, interventions or models to assist decision making and management, including identifying symptoms, predicting outcomes and identifying individuals at risk - testing and evaluating management regimes and strategies
7.4 Resources and infrastructure (disease management)	development and/or distribution of resources and equipment for use by the community including informatics systems - infrastructure support for trials, networks, consortia and centres

Research Activity Codes

8 Health and Social Care Services Research	**Research into the provision and delivery of health and social care services, health policy and studies of research design, measurements and methodologies**
8.1 Organisation and delivery of services	Examining the organisation and provision of health and social care services and evaluating factors affecting the quality of care - workforce and career issues - organisation and management of services - access to health and social care and geographical variations in outcomes - effectiveness of different care settings and models of service delivery - evaluating quality of care including patient safety issues - evaluation of experiences of service users - assessment of current and future health care demands - development and evaluation of interventions to improve services
8.2 Health and welfare economics	Economic evaluation of health and social care interventions and delivery including - cost-benefit analysis of services including economic modelling - cost effectiveness or economic feasibility of implementing new interventions or technologies within health services - economic assessment of service productivity and outcomes - health care costs - development and evaluation of economic models of health care
8.3 Policy, ethics and research governance	- evaluation of local, regional and national healthcare policy - impact of legislation - synthesis and evaluation of evidence to inform policy - dissemination and implementation of research evidence - research ethics including use of personal data and biological material, consent and confidentiality - research governance and regulation processes including interpretation of guidelines - issues surrounding research subjects and donor recruitment
8.4 Research design and methodologies	Development of research designs and novel methodologies for health care including treatment, management and health services research - analytical innovation, methodological research, statistical methods and modelling - development of research measurements including outcome measures - development of methods of research assessment and evaluation - development and evaluation of research designs and methodologies
8.5 Resources and infrastructure (health services)	- development and distribution of resources for use by the community including informatics systems - infrastructure support for networks, trials, consortia and centres

Indirect Research Cost (IRC) is provided to PIs and Host Institutions, up to a maximum of 20% of the direct cost (less exceptional items).

Type of Expenses	**Description**
EOM Related Expenses	
Salaries, CPF and fringe benefits including medical, dental, contribution to welfare fund, etc.	Allowable as part of overall compensation to employees provided such costs are incurred under formal established and consistently applied policies of the host Institution. The manpower funded as part of the direct cost should be directly involved in the research work of the project. The salaries offered to staffs should be reasonable, in line with local market benchmarks and comply with formal established pay scale of the host institution that is consistently applied regardless of the source of funds. Core manpower fundable under the direct cost only: - Research fellow, - Research engineer/scientist, - Research assistant/associate, - Specialist laboratory technician, - Biostatisticians, - Statistician, - Health Economist, - Epidemiologist, - Nurses, and - Technical officer. All other manpower will fall under IRC. Case by case consideration will be given if the PI can justify that the required manpower should be funded under the direct manpower cost.
Annual leave	Allowable for employees. The number of days of leave accorded to staff must be in accordance with formal policies of the host institution that is consistently applied regardless of the source of funds.
Bonus / Incentive payments,	Allowable as part of a total compensation package, provided such payments are reasonable and are made according to a formal policy of the host institution that is consistently applied regardless of the source of funds.
Staff insurance	Allowable as part of overall compensation to employees provided such costs are incurred under formal established and consistently applied policies of the host institution.

Type of Expenses	Description
Participation of overseas experts	Allowable. Expenses incurred for overseas experts invited to participate in the project and staying in Singapore for at least 6 months per year must be budgeted separately in the project budget under the category for Visiting Professor/Expert. For other overseas experts staying for less than 6 months per year, the cost of his/her stay is allowable if the costs are specifically provided for and approved in the project grant. Examples of such costs are honoraria, salaries, staff relocation, settling-in allowances and other related cost For staff relocation, settling-in allowances, etc, it will be allowable for senior expatriate R&D staff if the costs are specifically provided for and approved in the project grant. However, superannuation contributions for such staff are not allowed under both direct cost and IRC.
Staff recruitment and related cost	Not allowable under direct cost. Examples of such costs are advertisement and recruitment agency cost. These expenses can be claimed under IRC.
Stipends and course fees of full-time and/or part-time graduate research students	Not allowable under both direct cost and IRC. Only student attachment and top-up for research students are fundable under IRC.
PI's, co-investigators' & collaborators' EOM	Not allowable under both direct cost and IRC.
Equipment Related Expenses	
New equipment	Allowable if needed specifically for the project. Each equipment must be individually identified and its total cost inclusive of bank charges, delivery and installation, etc estimated. For equipment costing more than S$100,000, they will be classified under "**Exceptional Items**" (see para 3.10 in the CD-PHRG Policy Document on Financial Regulations). For purchase of such equipment, 3 quotations must be provided in the budget along with full justifications for the need to purchase the equipment.

Type of Expenses	Description
General purpose IT and communication equipment	Not allowable under direct cost. Examples of such costs are computers, office productivity software, PDAs, mobile phones, etc. The cost of such equipment can be claimed under IRC. The procurement of such equipment must be reasonable and made according to the formal established and consistently applied policies of the host institution.
General furniture and office equipment	Not allowable under direct cost. Examples of such costs are fax machines, photocopier machines, workstations and printers, etc. The cost of such items can be claimed under IRC. All procurement of such items must be reasonable and made according to the formal established and consistently applied policies of the host institution.
OOE Related Expenses	
Consumables	Allowable. Examples of such costs are supplies and materials, laboratory consumables, animals and drugs which are necessary for the successful execution of the funded project. All procurement of such items must be reasonable and are made according to the formal established and consistently applied policies of the host institution.
Drug costs and medical procedures for patients and volunteers	Allowable.
Local & Overseas conferences	Allowable, if conference is directly relevant to the research area or necessary to accomplish the project objectives for PI, co-investigators, collaborators, researchers and research students funded under the project grant. The expenses for such conferences may include registration fee for the conference, air tickets, per diem and other allowances. Such payments should be in accordance with the formal policies of the host institution. If the conferences are conducted overseas, the travel policy of the host Institution must be consistently adhered to. However, total expenses for travel per trip per person must not exceed $6,000. In addition, the total expenses for overseas travel for each project should not exceed *$6,000 x duration of project*

Type of Expenses	Description
	(in years) unless specifically provided for and approved in the Research. For example, the maximum expenses allowed for overseas travel for a 2-year project is capped at $12,000 (i.e. $6,000 x 2 years). The PI must submit a copy of the abstract and acceptance letter from the conference organisers in addition to related receipts when claiming reimbursement for such expenses and append to their annual/ final report.
Bank charges	Allowable as long as it is specifically related to the payments for consumables and equipment used in the project.
Customs and import duties	Allowable as long as it is specifically related to importation of consumables and equipment used in the project.
Books and specialised journals relevant to the research	Allowable. If the host institution has a library, books and journals should be obtained from the library and PI should refrain from purchasing the same books or subscribing to such journals.
GST	Allowable for expenses incurred for the project.
Photocopying and printing charges	Allowable.
Publications	Allowable. Page charges for publication of manuscript in professional journals are allowable if they adhere to the formal established policy of the host institution, where applicable. The costs of reprints and publishing in other media, such as books, monographs and pamphlets are not allowable unless specific approval has been obtained from the MOH.
Repairs and maintenance of research equipment	Allowable if specifically budgeted for in the project and the equipment is used extensively for the benefit of the research project.
Stationery & printer consumables	Allowable. Examples of such costs are printer cartridges, etc.
Training	Allowable. Funding for training is allowable for the PI, co-PIs and the collaborators. For funding of the research personnel, it should be restricted to the personnel employed under the project grant and for training that is of direct benefit and specific to

Type of Expenses	Description
	the research project.
Transportation, postage & courier services	Allowable. This includes postage, courier and freight charges for bringing in equipment and specialised research consumables and reimbursement for staff transportation.
Use of services, equipment rental or lab spaces within the host institution's central facilities	Allowable. The cost for the use of the services and central facilities owned by the host institution such as animal holding units, central laboratory services are allowable and must be based on host institution's fee schedules which are consistently applied regardless of source of funds. Host institution may be requested to certify that the fee structure is applied consistently.
Payment to volunteers and research patients and other related cost	Allowable for payment to volunteers and research subjects provided this is the scope of the research and has been provided for and approved in the grant. Examples of such payments may include inconvenience fees, transport and meal reimbursement, etc. Press advertisements for patients are allowable under IRC only.
Audit fees	Not allowable under direct cost. This includes both internal and external audit fees. These expenses can be claimed under IRC.
Entertainment & Refreshment	Not allowable under direct cost. These expenses can be claimed under IRC.
Fines and penalties	<u>Not allowable under both direct cost and IRC.</u>
Insurance premiums	Not allowable under direct cost. Examples of such costs are for equipment, workmen compensation, professional indemnity of researchers funded under NMRC/NRF grants. These expenses can be claimed under IRC. The host institution is responsible for the insurance of the equipment, relevant workmen compensation and professional indemnity insurance which are in line with the host institution's risk policies.

Type of Expenses	**Description**
Legal fees	Not allowable under direct cost and IRC.
Outsourcing	Not allowable under direct cost unless specifically provided for and approved in the grant.
Overhead expenses - rental, utilities, telephone charges, facilities management, repairs and maintenance, etc	Not allowable under direct cost. These expenses can be claimed under IRC.
Patent-related expenses	Not allowable under direct cost and IRC. Such cost should be borne by the host institution.
Professional fees (including fees to consultants)	Not allowable under direct cost. These expenses can be claimed under IRC.
Professional membership fees of PIs /RFs /RAs funded from the grant	Not allowable under direct cost. These expenses can be claimed under IRC.
Staff retreat	Not allowable under direct cost. These expenses can be claimed under IRC.
Cost of capital works and general infrastructure	Not allowable under direct cost unless specifically provided for and approved in the grant.

Non-Fundable Items

EOM Related Expenses
1 PI's, co-investigators' & collaborators' EOM 2 Stipends and course fees of full-time and/or part-time graduate research students 3 Superannuation contributions for senior expatriate R&D staff
OOE Related Expenses
4 Fines and penalties 5 Legal fees 6 Patent-related expenses
Others
7 Non cash items such as depreciation cost, amortization cost, loss on revaluation, etc.

Exceptional Items (not taken into account for IRC computation)**:**

i Major equipment costing more than S$100,000;

ii Intellectual property that is needed to carry out the proposed R&D work;

iii Subcontracting of non-research work (e.g., the development of tools for the research);

iv Payment to volunteers and research patients (patients or healthy volunteers); including drug costs, medical procedures and clinical services such as blood tests, scans, endoscopy, etc even if these are required as part of the research project; and

v Infrastructural work that is approved (following strong justifications) as a direct cost of the research grant.

Summary

Item	Direct Cost	Indirect Research Cost (IRC)	Non Fundable	Specifically provided for and approved in grant
EOM Related Expenses				
Salaries, CPF and fringe benefits including medical, dental, contribution to welfare fund, etc.	√			
Annual leave / Bonus / Incentive payments	√			
Staff insurance	√			
Participation of overseas experts	√			
Student attachment and top-up for research students		√		
Staff recruitment and related cost		√		
PI's & co-investigators' EOM			√	
Stipends and course fees of full-time and/or part-time graduate research students			√	
Superannuation contributions for senior expatriate R&D staff			√	
Equipment Related Expenses				
New equipment	√			
General purpose IT and communication equipment		√		
General furniture and office equipment		√		
Consumables Related Expenses				
Consumables (e.g. supplies and materials, laboratory consumables, animals and drugs)	√			

Item	Direct Cost	Indirect Research Cost (IRC)	Non Fundable	Specifically provided for and approved in grant
OOE Related Expenses				
Bank charges	√			
Customs and import duties	√			
Books and specialised journals relevant to the research	√			
GST	√			
Local & overseas conferences	√			
Outsourcing				√
Photocopying and printing charges	√			
Publications	√			
Repairs and maintenance of research equipment	√			
Stationery & printer consumables	√			
Training	√			
Transportation, postage & courier services	√			
Use of services, equipment rental or lab spaces within the host institution's central facilities	√			
Volunteers and research patients and other related cost	√			
Press advertisements for patients		√		
Audit fees		√		
Entertainment & refreshment		√		
Insurance premiums		√		
Overhead expenses (eg. rental, utilities, telephone charges, facilities management, repairs and maintenance, etc)		√		

Item	Direct Cost	Indirect Research Cost (IRC)	Non Fundable	Specifically provided for and approved in grant
Professional fees (including fees to consultants)		√		
Professional membership fees of PIs /RFs /RAs funded from the grant		√		
Staff retreat		√		
Fines and penalties			√	
Legal fees			√	
Patent-related expenses			√	
Cost of capital works and general infrastructure				√
Others				
Non cash items such as depreciation cost, amortization cost, loss on revaluation, etc			√	

Appendix 4

Study Design and Statistical Considerations - Checklist ☑

All applicants must give careful thought to the study design, methods and statistical considerations, and ensure that they are reflected in the grant application.

In planning for the research study design and methodology, please refer to internationally recognized guidelines for good reporting of health research studies, such as the Equator Network (http://www.equator-network.org/). The Equator (Enhancing the Quality and Transparency of Health Research) Network provides good reference for health research reporting guidelines for various types of studies, and signposts researchers to relevant reporting guidelines.

As an example, observational studies in Epidemiology would be referred to the STROBE (Strengthening the Reporting of Observational studies in Epidemiology) guidelines (http://www.strobe-statement.org/).

Annex A

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 care [i]

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%.[1i] 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 induceddiseases. 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. <u>Dengue Prevention and Control</u>

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. <u>Infections in Special Populations</u>

  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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