



Research at IIDE

Prof (Dr) Yee-Sin LEO
Clinical Director Communicable Disease Centre
Director Institute of Infectious Diseases and Epidemiology
Tan Tock Seng Hospital

May 2014

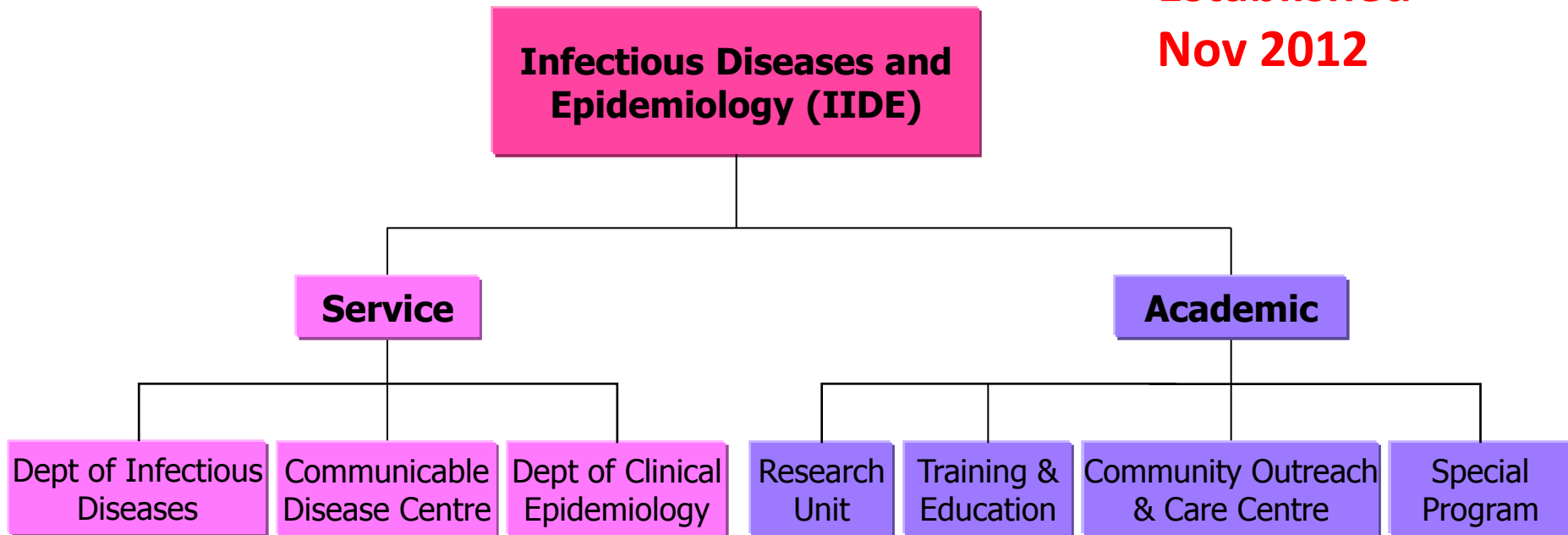
National Appointments

- **Clinical healthcare provider** to the people in the **central region of Singapore**, with focus on patient care in areas of infectious disease and diseases of public health interest
- **National Referral Centre** for Communicable Diseases and HIV Infection, and for Healthcare and non-Healthcare related Infectious Post Exposure Management
- Designated **National Outbreak Centre and Isolation Facility**
- **Advisory to Ministry of Health** on Infectious Diseases



Institute of Infectious Diseases and Epidemiology (IIDE)

**Established
Nov 2012**



Tan Tock Seng
HOSPITAL

National Centre for Infectious Diseases



This is the artist impression of NCID in 2018

Health City Novena



IIDE
Institute of Infectious Diseases
and Epidemiology

HEALTH CITY NOVENA

LEGEND:

Existing building

Completion by 2020

Completion by 2030

Future Health Sciences School

Proposed National Skin Centre Extension and National Healthcare Group Headquarters

Proposed Integrated Intermediate Care Club

Medical Education and Training Building

LKCmedicine Clinical Sciences Building

Reserved site, no details yet

National Centre for Infectious Diseases

Ren Ci Community Hospital

Tan Tock Seng Hospital

LKCmedicine Headquarters

Central Park

Proposed Ambulatory Expansion and Clinical Staff Office & Training Annex

Community Hub

TTSH Museum

SINARAN DRIVE

JALAN TAN TOCK SENG

MANDALAY ROAD

MOULMEIN ROAD

ST GRAPHICS
PHOTO: TTSH

TTSH Campuses (Total Staff Strength 6383)



TTSH

No. of Beds: 1060



Rehabilitation Centre @ Ang Mo Kio Hospital

No. of Beds: 93



Communicable Disease Centre 1

No. of Beds: 91

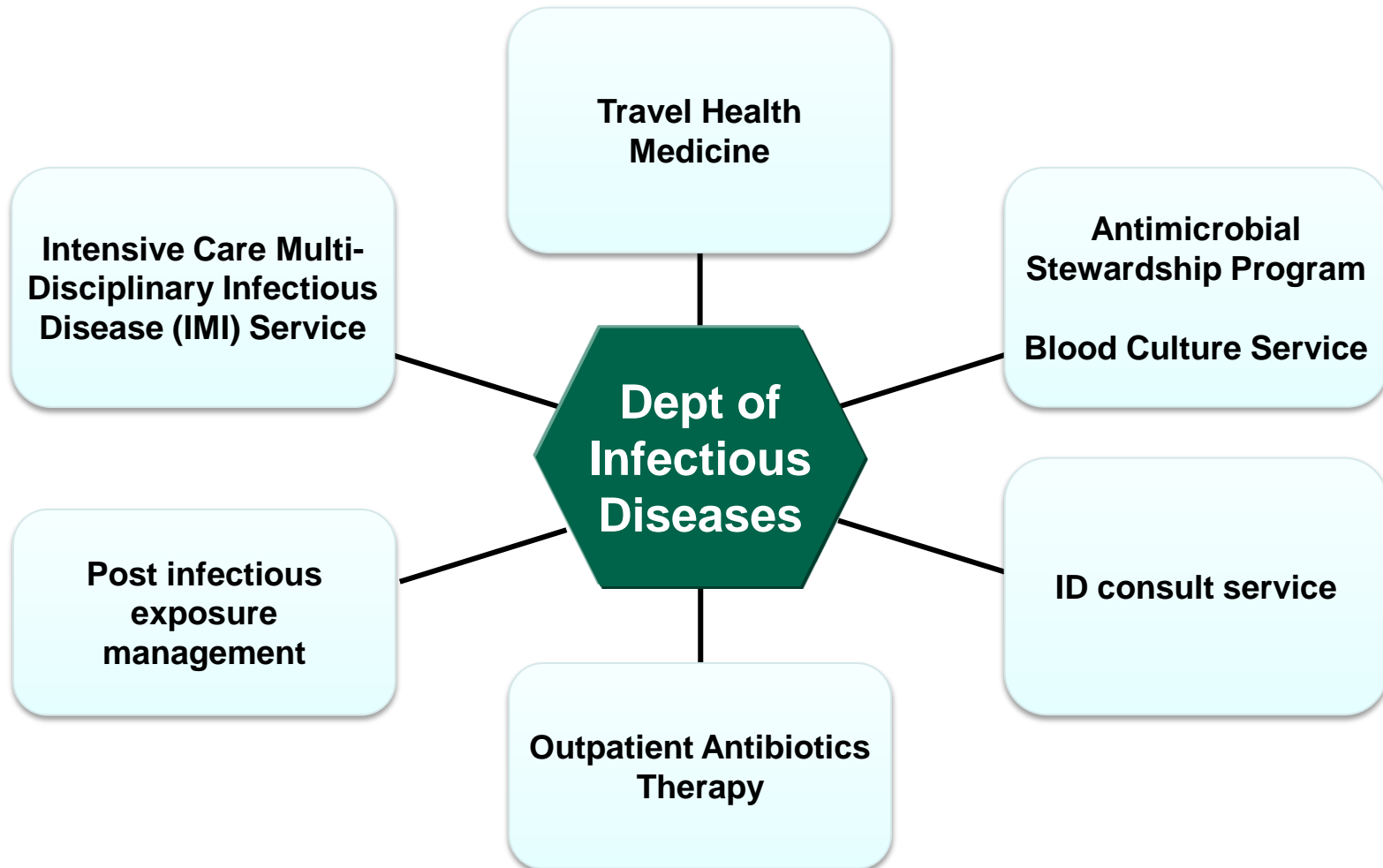


Communicable Disease Centre 2

No. of Beds: 76

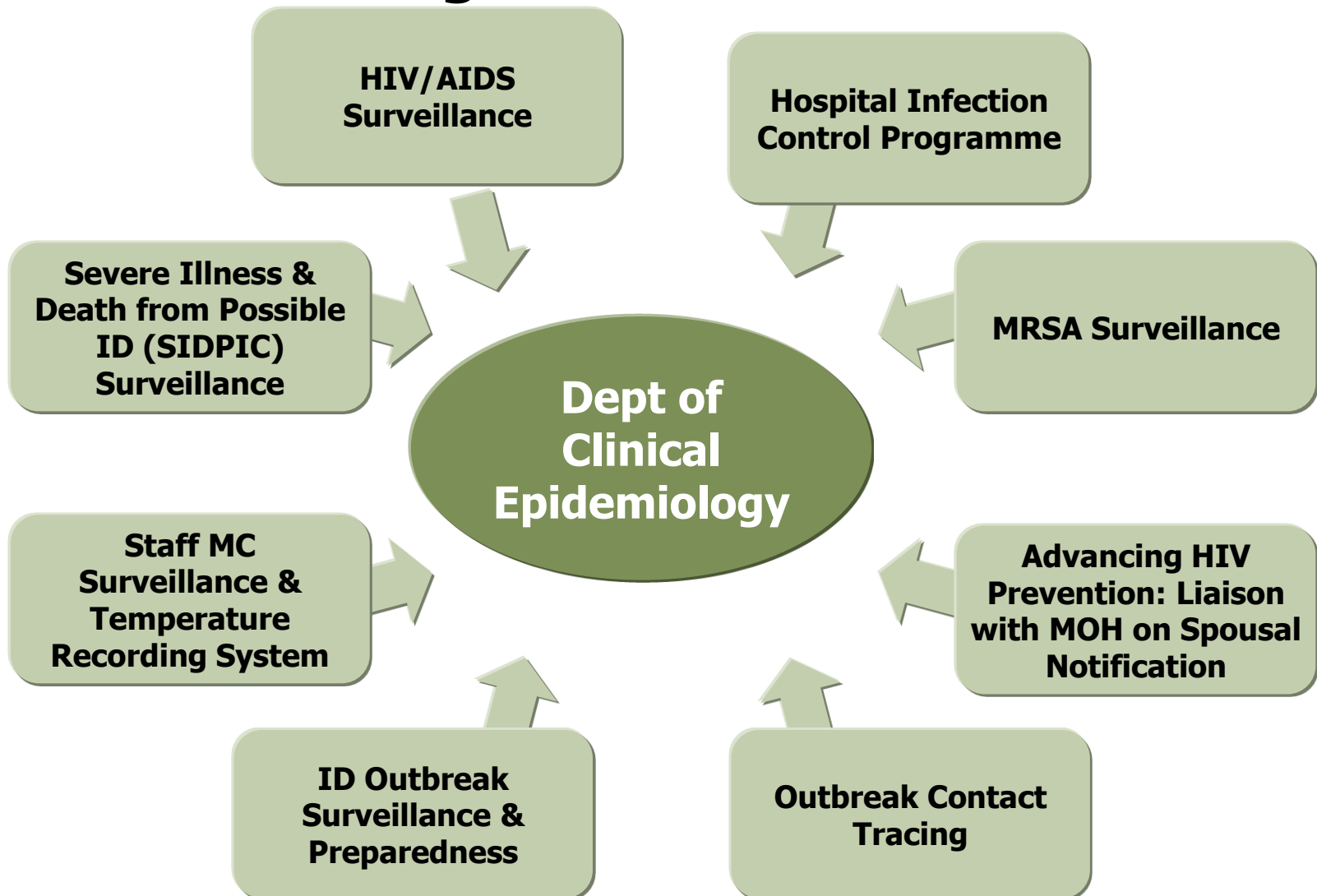
Department of Infectious Diseases

Sub-Specialty Teams



Department Clinical Epidemiology

Surveillance Programs



Communicable Disease Centre CDC

HIV Programme

- CDC is the key referral center for HIV management in Singapore

-Programme endeavors to:

- ❖ Provide access to care, treatment & psychosocial support to patients living with HIV/AIDS
- ❖ Make available a variety of services to assist them in their needs
- ❖ Provision of care include medical & non-medical (DAP, PPP, vaccination programmes)



Power to Change
Campaign (2012)



Outbreak Management

-CDC plays a vital role & function in Singapore's public health system.

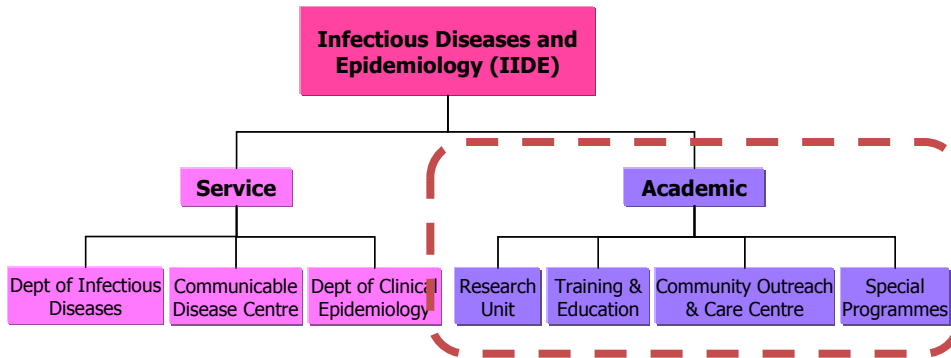
- We have dealt with past outbreaks such as:

- ❖ Nipah Virus (1999)
- ❖ SARS (2003)
- ❖ Dengue (2005 & 2007)
- ❖ Chikungunya (2008)
- ❖ H1N1 (2009)

- Exercise Drills are also conducted yearly in collaboration with the Ministry of Health Singapore



Academic Arm of IIDE



Research Unit

- Research focus on Emerging Infection (Dengue), HIV, Influenza, antimicrobial resistance
- Building & consolidation research focus/infrastructure

Training & Education

- Undergraduate, post-graduate
- YLL SOM and LKC SOM Residency Program
- Regional APEC, ID conference, short course

Community Outreach & Care Centre

- Rehabilitation program for HIV/AIDS patients
- Public education and volunteer training program
- Community outreach on preventable IDs (vaccination / antimicrobial)

Special Program

- Watch this space

Staff Profile

Our Staff Strength

- 38 Doctors
- 137 Clinical and Non-Clinical Support Staff
- 39 Research Staff



Communicable Disease Centre



Communicable Disease Centre 2

Our Facilities

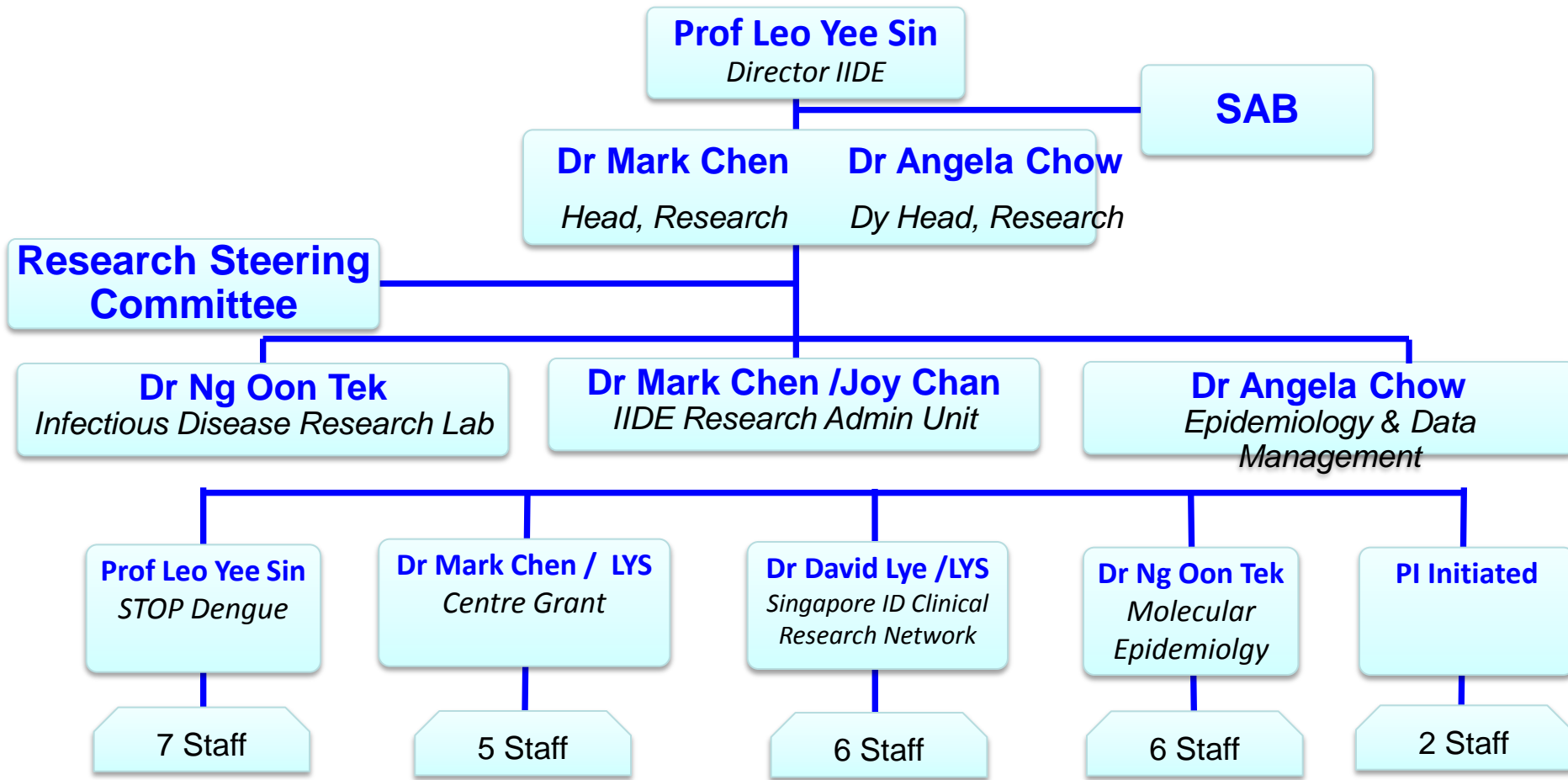
- 3 Outpatient Clinics
- 2 Isolation Inpatient Facilities (305 beds)
- 1 Research Laboratory
- 1 Research Clinic
- 1 Patient Care Centre

Our Workload (Year 2013)

- **Inpatient**
 - 2,265 inpatient admissions
 - 17,069 patient days 50.1% average bed occupancy with 7.4 days average length of stay
- **Outpatient**
 - 20,397 SOC attendances

2013

IIDE Research Structure



Research Themes for Centre Grant

HIV

**Emerging
Infectious
Diseases**

**Vaccine
Preventabl
e Diseases**

AMReP

**Travel
Medicine &
Int'l Health**

**Severe
Infection
Mgt**

Epidemiology

Clinical Trials

Laboratory Services

IIDE Strategy in Research



Develop Human Capital in Research



Strengthen core Research Capabilities and Infrastructure



Building upon established foundation in Research



Expand and establish new partnerships and collaborations in Research



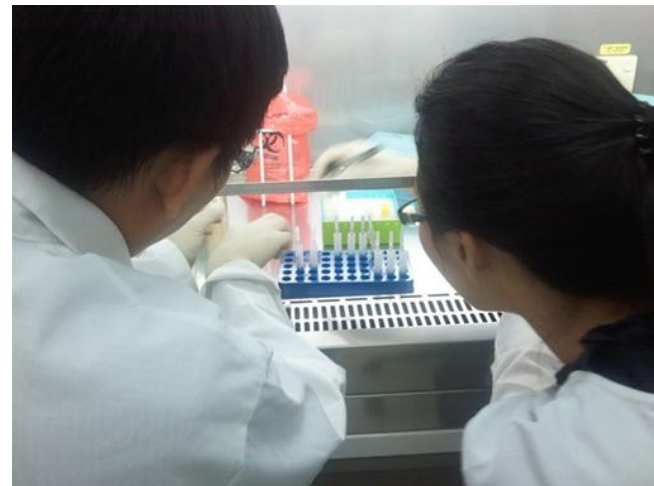
Research Infrastructure at CDC/IIDE

Current structure:

- Infectious Disease Research Clinic
- Office Space
- Infectious Research Laboratory (main TTSH)
- Infectious Research Laboratory (CDC)



ID Research Clinic



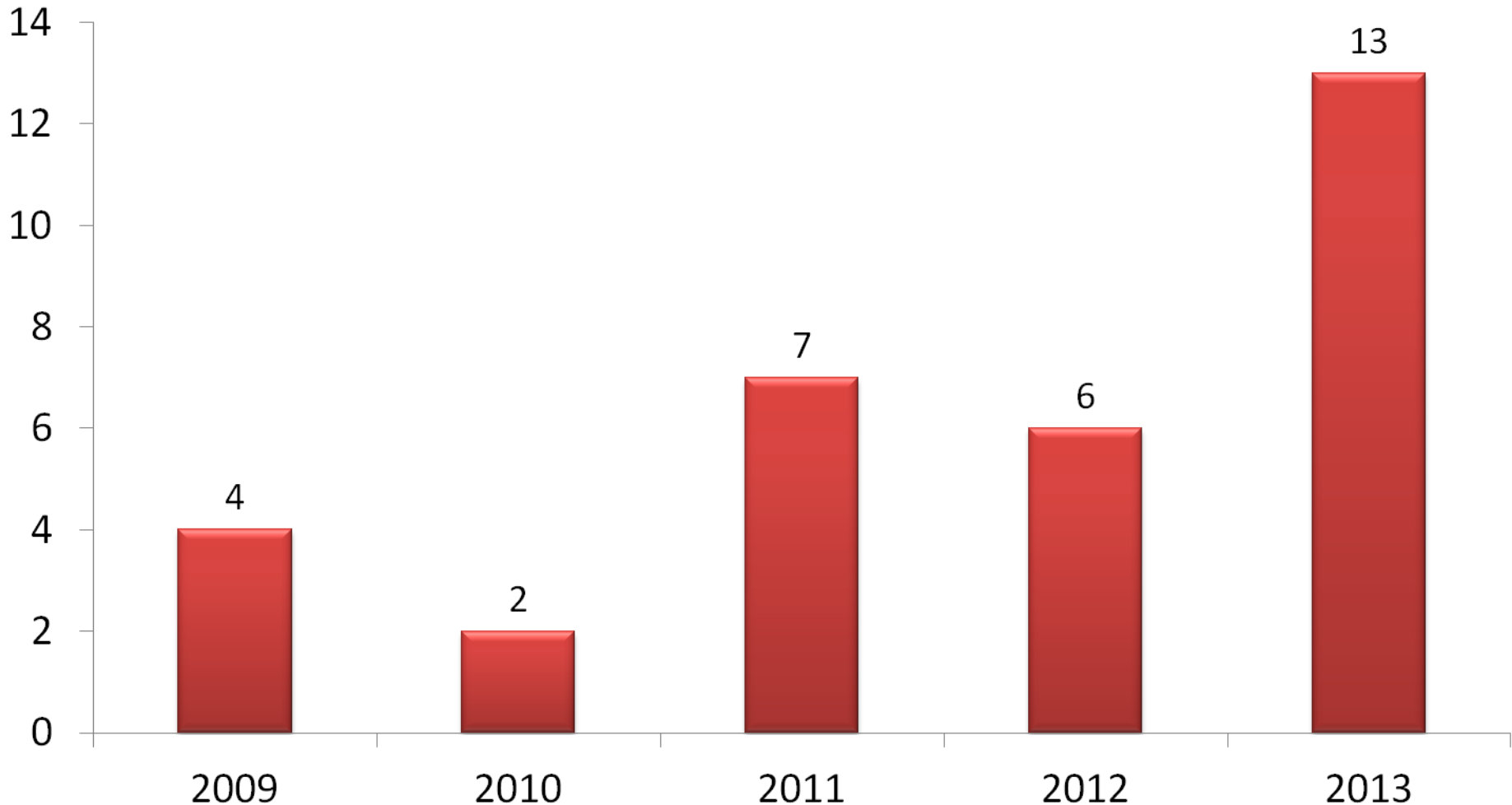
Infectious Disease Research Lab

New Infrastructure at NCID in 2018

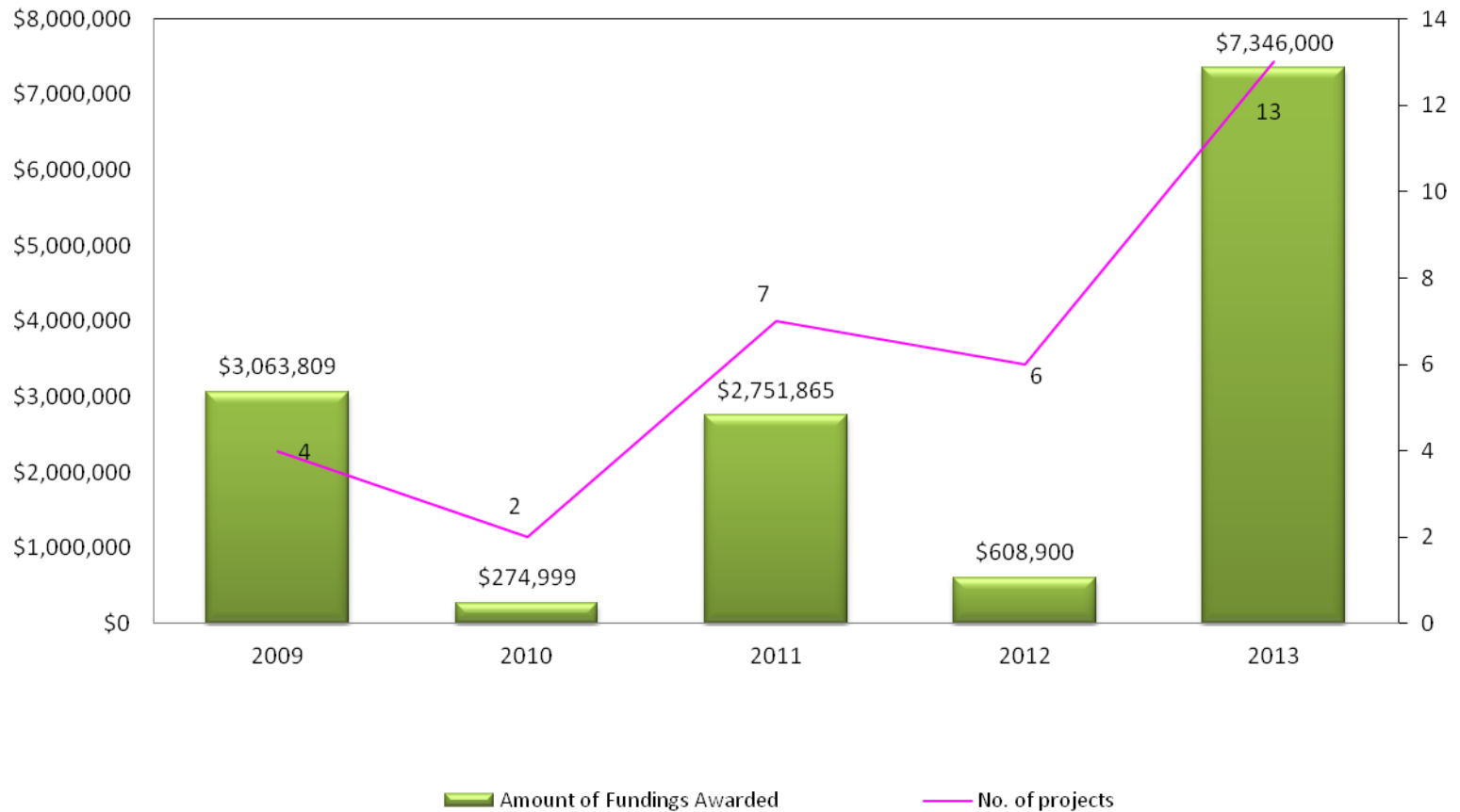
New structure in planning

- Research Office (60+ seating capacity)
 - Research Clinic (full fledge)
 - In-patient Research Facility (Phase 1 ward layout)
 - Research Laboratory
- In addition: NPHL with BSL3 will also be housed in this 14-storey building

No. of Grants Awarded (2009-2013)

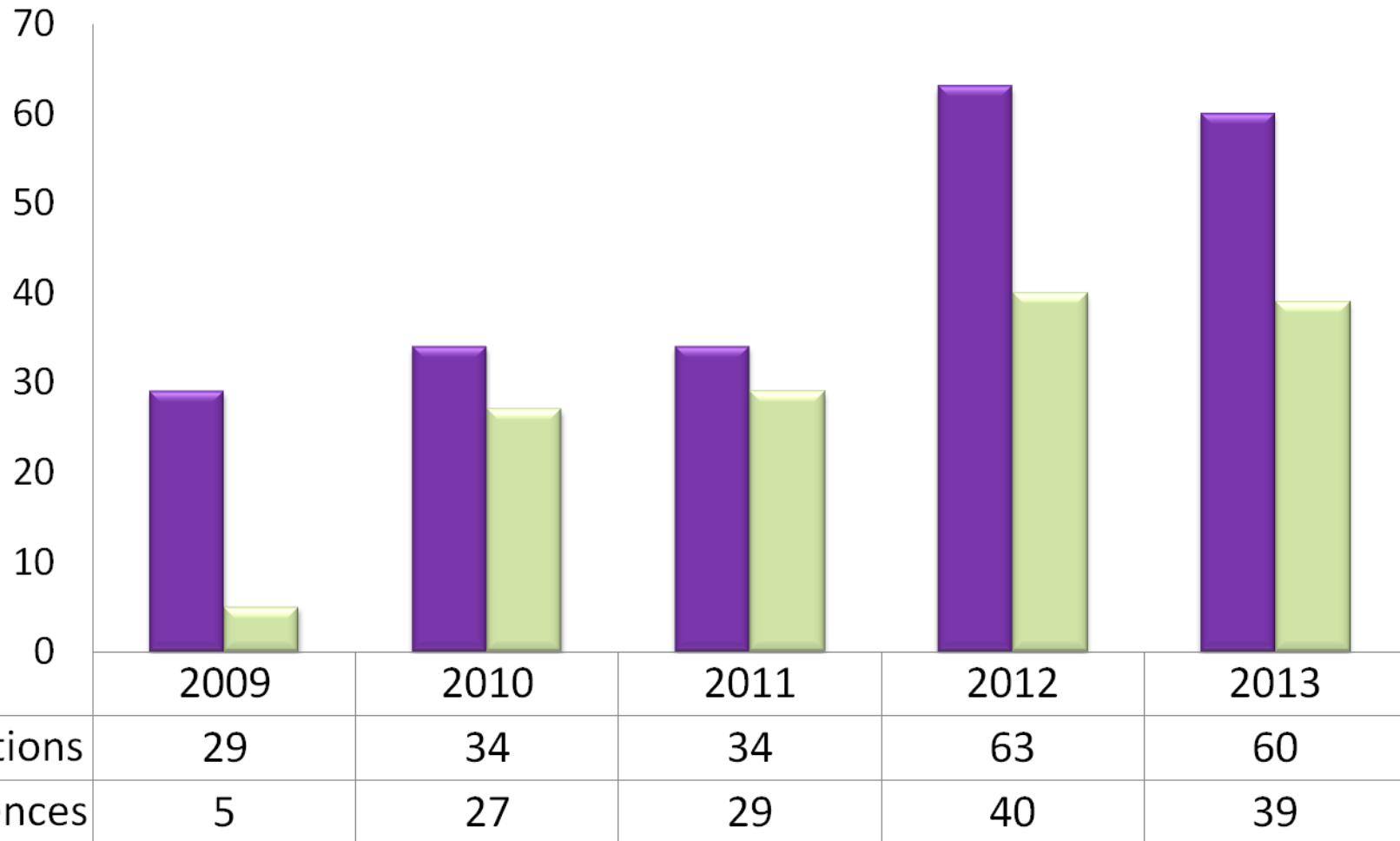


Amount of Funding Awarded (2009 – 2013)



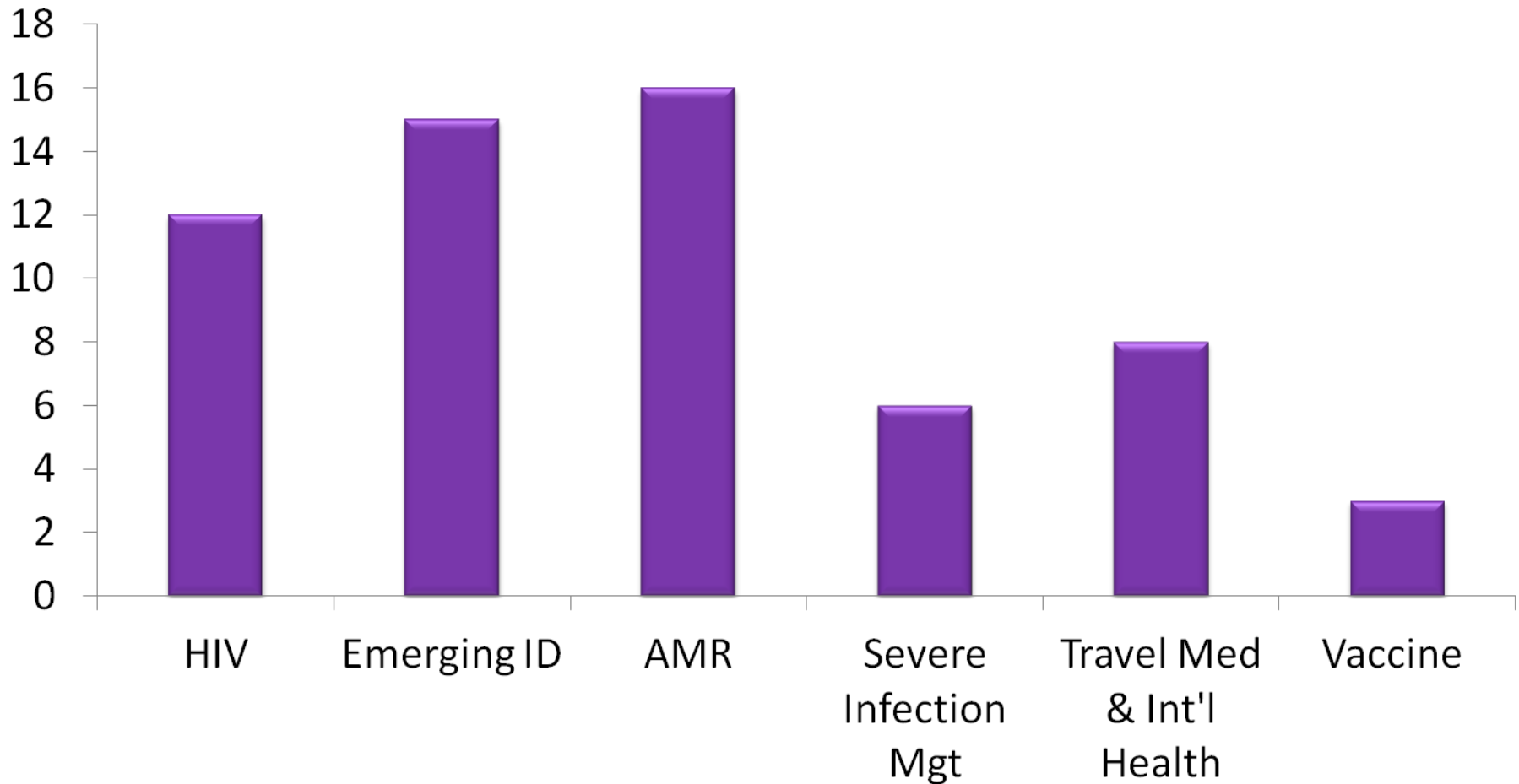
Publication Trend

Trending of Publications & Conference Abstracts (2009-2013)



Publications based of Theme(2013)

No. of Publications



Our Major Collaboration Partners

NHG Institutions

NSC
NHG Polyclinics
IMH
NHG-RDO, HQ

TTSH

DLM	Quality Council
OCG	
Pharmacy	Occupation Medicine
DICC	
Other Depts	



Singapore Academic Medical Centres
LKC SoM NTU, YLL SoM NUS ,
Duke-NUS, SSH School of PH NUS

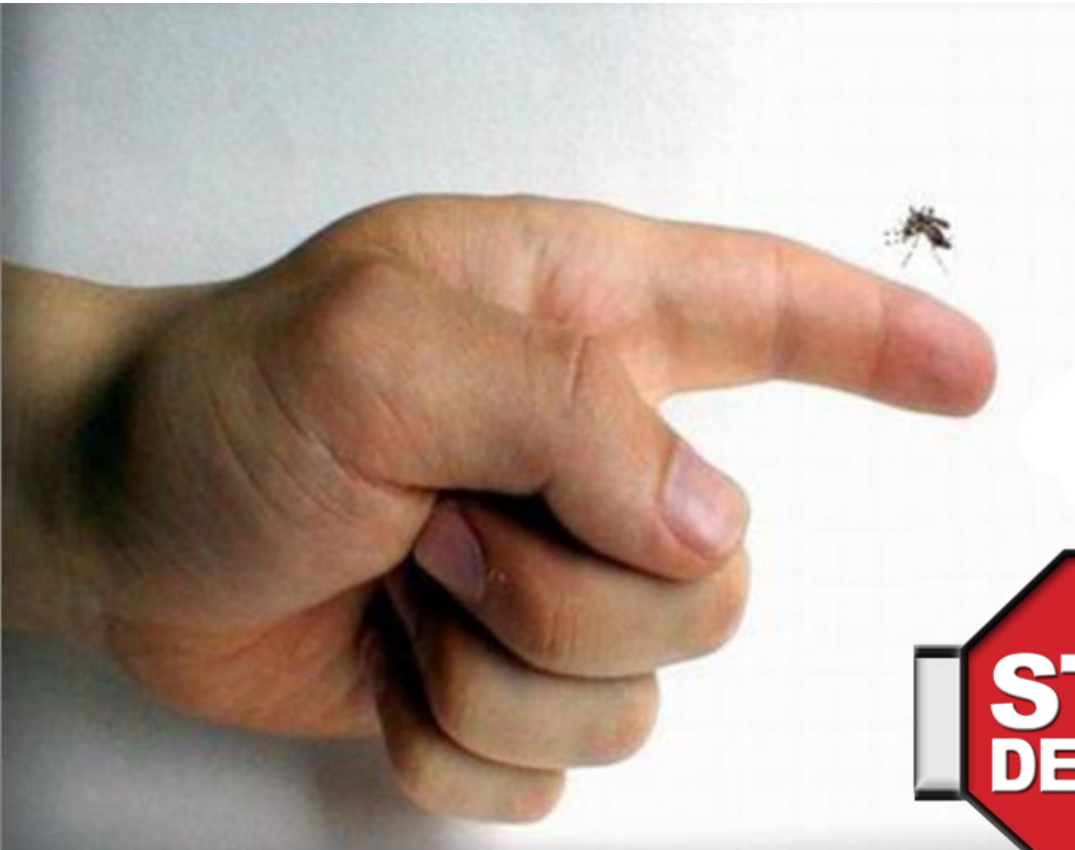
Hospital Network (horizontal)
SGH, NUH, JGH, CGH, JH, KKWCH, KTPH

Community network (Vertical)
LTC, Primary care, community

Singapore Partners in Research
MINDEF, A*STAR, MOH, CIDR

Regional /International Collaborators

TAHOD, ANSORP, WHO/WPRO, Johns Hopkins
Beijing Institute of Respiratory Medicine, China
Oxford University Clinical Research Unit, UK)
PIRDE study (University of Nottingham, UK)
National Pediatric Hospital, Cambodia)
University Malaya Medical Center, M'sia)



S SCIENTIFIC EXPLORATION
T RANSLATION RESEARCH
O PERATIONAL EVALUATION
OF DISEASE PREVENTION
P REVENTIVE MEASURES
THROUGH NEW TREATMENT STRATEGIES AGAINST

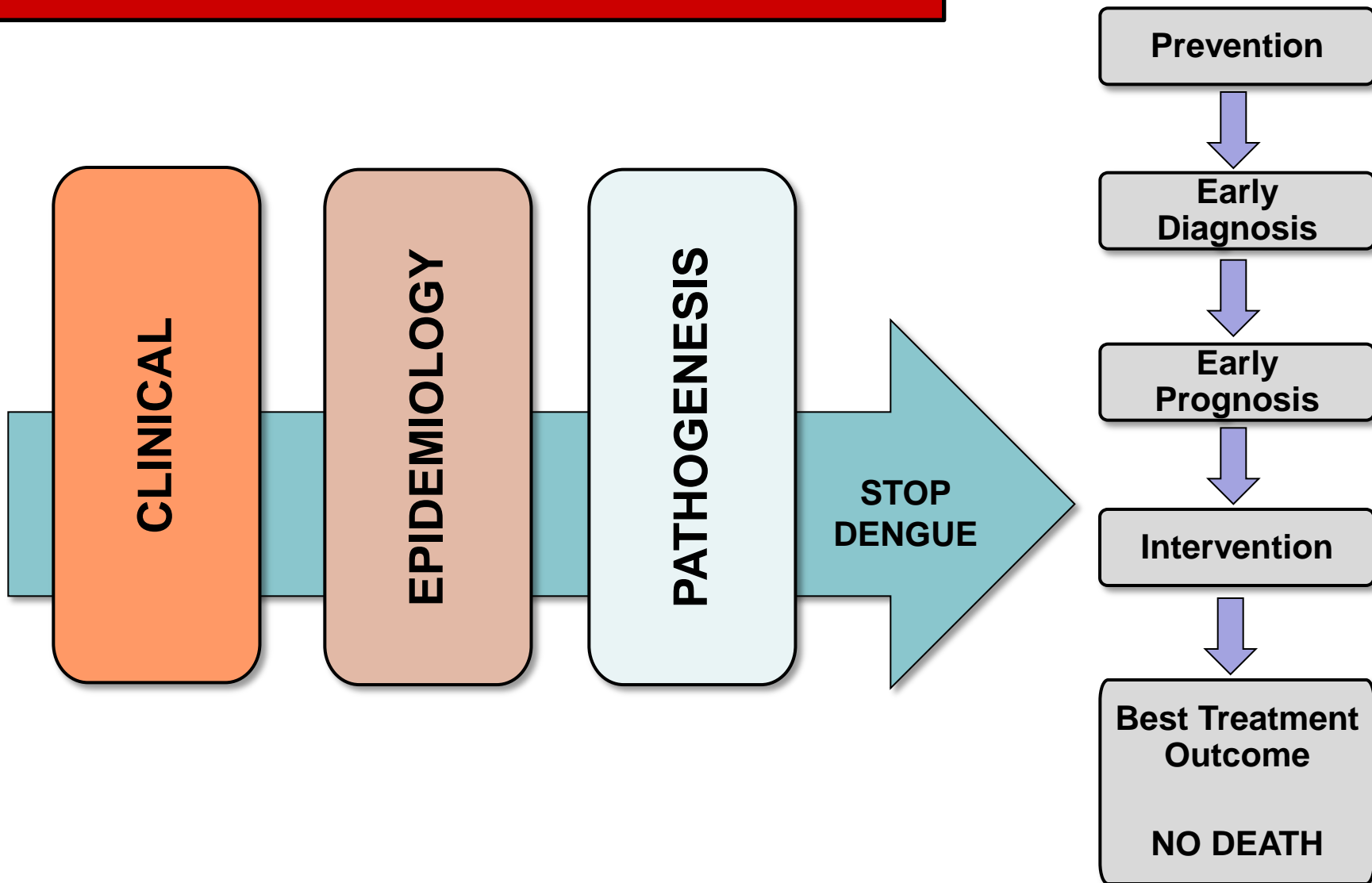
DENGUE



Lead PI Prof Leo Yee Sin

Director, Institute of Infectious Diseases and Epidemiology
Clinical Director, Communicable Disease Centre
Senior Consultant, Department of Infectious Diseases
Tan Tock Seng Hospital

Research Structure



STOP Dengue Achievements: KPIs

37 oral & 68 poster presentations at top tier international conferences (ASTMH, ICID, ICAAC, ECCMID)

✓ Original KPI target = 20

100 international peer reviewed publications

✓ 83 directly from STOP dengue

✓ Original KPI target = 20

8 PhD students graduated & 8 in training

✓ Original KPI target = 10

5 Masters students graduated

✓ Original KPI target = 4

4 patent applications (vaccine, 2 biomarkers, mAb)

✓ Original KPI target = 2

2 licenses (D2Y98P virus)

\$2.92 million in competitive research grants awarded

✓ NRF POC – Mary Ng, 2013 (\$248,500)

✓ NMRC CSA – Ooi Eng Eong, 2011 (\$1,649,000)



Day 8 illness, afebrile

Improving Healthcare Practices: Now widely adopted



The CDC hopes to get clinics here to start using a new dengue test kit which can produce results in 20 to 30 minutes, with just three drops of blood. ST PHOTO: ANDREA ONG

Point-of-care-test POCT
Diagnostic / prognostic
Dengue and beyond

**PADS cohort:
Sensitivity = 94% & Specificity = 92%**

**Implementation of NS1 POCT at
TTSH ED in early 2013**

Just 30 mins to check if you have dengue

By **ANDREA ONG**

A NEW test using only about three drops of blood will determine in just half an hour or less if you have dengue.

That is the benefit of a new dengue diagnostic kit which produces rapid and reliable results.

The Communicable Disease Centre (CDC) at Tan Tock Seng Hospital will partner clinics in Singapore to roll out this test kit, as part of a move to establish a primary care network to fight infectious diseases.

The centre sent 1,500 letters to general practices last week to invite doctors to come on board, said clinical director Leo Yee Sin.

92 per cent.

The former measures a test's ability to correctly identify a diseased person, while the latter measures its ability to correctly identify a disease-free person.

The downside of clinical diagnosis is that early dengue symptoms such as fever and muscle aches can be hard to distinguish from other causes, said Prof Leo.

Doctors can be more confident the patient has dengue only from the fourth day, when other signs appear.

The CDC will present its findings on Dengue Duo at the first Singapore International Conference on Dengue and Emerging Diseases, which began yesterday.

World Health Organisation

2009



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Textbox E. Admission criteria

<p>Warning signs</p> <p>Signs and symptoms related to hypotension (possible plasma leakage)</p> <p>Bleeding</p> <p>Organ impairment</p> <p>Findings through further investigations</p> <p>Co-existing conditions</p> <p>Social circumstances</p>	<p>Any of the warning signs (Textbox C)</p> <p>Dehydrated patient, unable to tolerate oral fluids</p> <p>Giddiness or postural hypotension</p> <p>Profuse perspiration, fainting, prostration during defervescence</p> <p>Hypotension or cold extremities</p> <p>Spontaneous bleeding, independent of the platelet count</p> <p>Renal, hepatic, neurological or cardiac</p> <ul style="list-style-type: none">- enlarged, tender liver, although not yet in shock- chest pain or respiratory distress, cyanosis <p>Rising haematocrit</p> <p>Pleural effusion, ascites or asymptomatic gallbladder thickening</p> <p>Pregnancy</p> <p>Comorbid conditions, such as diabetes mellitus, hypertension, peptic ulcer, haemolytic anemias and others</p> <p>Overweight or obese (rapid venous access difficult in emergency)</p> <p>Infancy or old age</p> <p>Living alone</p> <p>Living far from health facility</p> <p>Without reliable means of transport</p>
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RESEARCH ARTICLE

Open Access

Utility of warning signs in guiding admission and predicting severe disease in adult dengue

Yee-Sin Leo^{1,2,3*}, Victor C Gan¹, Ee-Ling Ng¹, Ying Hao¹, Lee-Ching Ng⁴, Kwoon-Yong Pok⁴, Frederico Dimatatac¹, Chi-Jong Go¹ and David C Lye^{1,3}

Table 4 Performance of individual warning signs in predicting DHF and SD in outpatients

Warning sign	DHF I-IV (N = 70)				DHF II-IV (N = 43)				SD (N = 13)			
	Sn	Sp	PPV	NPV	Sn	Sp	PPV	NPV	Sn	Sp	PPV	NPV
Abdominal pain (N = 88)	31	78	25	83	37	78	18	91	38	77	6	97
Persistent vomiting (N = 16)	7	96	31	82	9	96	25	89	23	96	19	97
Clinical fluid accumulation (N = 1)	1	100	100	82	0	100	0	89	0	100	0	97
Mucosal bleeding (N = 154)	61	64	28	88	100	67	28	100	62	60	5	98
Hepatomegaly (> 2 cm) (N = 2)	1	100	50	82	0	99	0	89	0	99	0	97
↑ in hematocrit; rapid ↓ of platelet (N = 10)	14	100	100	84	9	98	40	89	31	98	40	98
Any warning sign (N = 203)	79	52	27	91	100	52	21	100	100	48	6	100
Two warning signs (N = 61)	33	88	38	85	47	88	33	93	46	85	10	98
Three warning signs (N = 7)	6	99	57	82	9	99	57	89	8	98	14	97

No single warning sign effectively predict disease progression

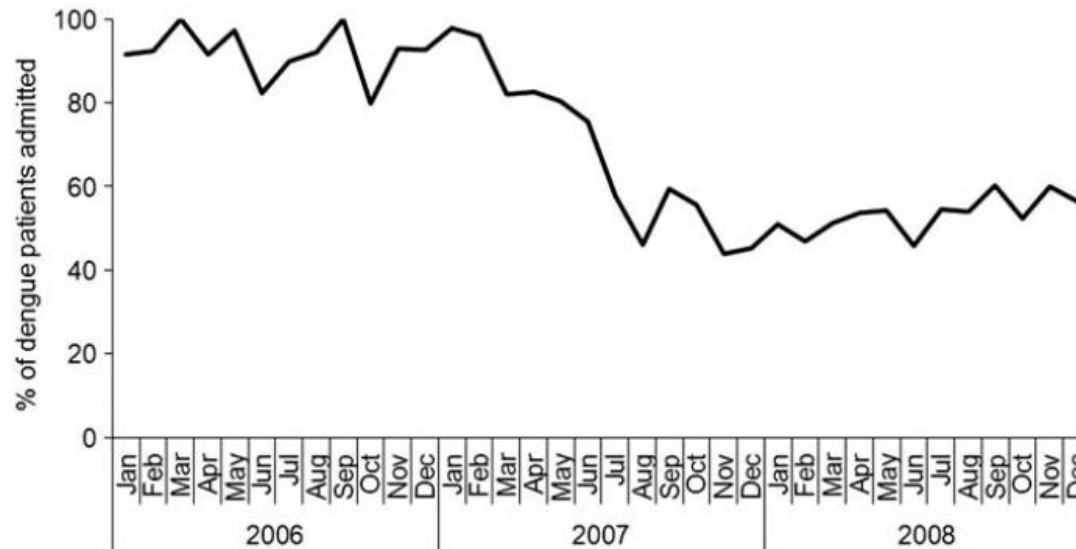
Absence of any warning predict the lack of disease progression

Reducing the burden on our healthcare system



Safety and cost savings of reducing adult dengue hospitalization in a tertiary care hospital in Singapore

Linda K. Lee^{a,*}, Arul Earnest^b, Luis R. Carrasco^c, Tun L. Thein^a, Victor C. Gan^a,
Vernon J. Lee^d, David C. Lye^{a,d} and Yee-Sin Leo^{a,d}



~30.5% hospitalised
in the 2013 outbreak

(versus 78-83% in
2004-2005)

Results: There was a 33.0% mean decrease in inpatients after the new criteria were implemented compared with the period before ($p < 0.001$). The proportion of inpatients with DHF increased significantly from 31.7% in 2006 to 34.4% in 2008 ($p = 0.008$); 68 DHF cases were managed safely on an outpatient basis after compared with none before implementation. DHF inpatients had more serious signs such as clinical fluid accumulation (15.5% vs 2.9% of outpatients), while most DHF outpatients had hypoproteinemia (92.7% vs 81.3% of inpatients). The eight intensive care unit admissions and five deaths during this time period all occurred among inpatients. The new criteria resulted in a median cost saving of US\$1.4 million to patients in 2008.

A significant impact on mortality



Year	Cases	Deaths	Case fatality rate
2005	14,209	25	0.18%
2006	3,127	10	0.32%
2007	8,826	24	0.27%
2008	7,031	10	0.14%
2009	4,497	8	0.18%
2010	5,363	6	0.11%
2011	5,330	6	0.12%
2012	4,632	2	0.04%
2013	22,318	8	0.04%

Case fatality rate has dropped significantly with better diagnostics and better triage by GPs and EMD, thanks partly to STOP Dengue outreach efforts

Implementation and health service studies

