NIH

commemorating translational

research

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ACKNOWLEDGEMENT

We would like to thank the Director General of Health Malaysia for his permission to publish this commemorative book. We would also like to extend our appreciation to all the six NIH Directors and Madam Ten Sew Keoh for their continuous and unanimous support, which has made this publication possible.

National Institutes of Health (NIH) is a network of Ministry of Health (MOH) research institutes. NIH is consisting of 6 institutes which are:

- Institute for Medical Research (IMR)
- Institute for Public Health (IPH)
- Clinical Research Centre (CRC)
- Institute for Health Systems Research (IHSR)
- Institute for Health Management (IHM)
- Institute for Health Behavioural Research (IHBR)

NIH aims to create seamless continuum from identification of research priorities, conduct of research to utilization of research findings.

National Institutes of Health (NIH)
Ministry of Health, Malaysia


HISHAM

foreword

It is my privilege to present this commemorative book to highlight some of the research that has been carried out by the National Institutes of Health (NIH) Malaysia.

The idea for the formation of NIH Malaysia was introduced during the 7th Malaysia Plan. By 2003, the six research institutes of the Ministry of Health (MOH) began to function as an entity to spearhead research to support health services in the country. This marked a significant milestone in the history of the MOH. Research is essential as it holds the key to unlock knowledge through scientific evidence to fight diseases and to formulate health plans. The NIH has indeed played a critical role in helping shape and influence our health policy and programmes, ensuring that health interventions and decision-making are based on research evidence of the highest quality.

The chapters and pages of this book highlight some examples of the impact of NIH research on health and healthcare delivery, presented through stories about scientific discovery, therapeutic innovations, laboratory diagnostics, patient engagement and intervention programmes. The conduct of these studies have also established public-private partnerships as well as collaborations of researchers from different areas of health discipline – clinicians, public health specialists, academicians, programme leaders and scientists. Some narratives describe what inspired the research, how it was nurtured by mentors, colleagues, and funders and the essence of its role in healthcare programmes.

It is timely that the NIH, 15 years since its inception, publishes this book so that others can view first-hand the research carried out by the various institutes.

Datuk Dr. Noor Hisham Abdullah
Director General of Health

preface

The National Institutes of Health (NIH) Malaysia lays emphasis on translational research and has invested resources to advance research programmes in this area. Translational research may mean different things to different people but we all do agree that it is important. For some, the endpoint of translational research is a product or therapeutic drug while for others it is a new policy or improved interventions for the community. Not all research will lead to policy or practice, and even when it does, it takes time. There are indeed many challenges that researchers face to fulfil stakeholders' expectation.

This first compilation of research by the NIH was motivated by our desire to highlight the work carried out by our researchers. The narrative accounts should pave the way forward for others to continue in developing sound scientific evidence for the definitive practice of medicine and healthcare in the country.

The contents reflect the body of work conducted by each of the institutes which range from technological innovations, diagnostics, health systems, public health, programme and policy formulation, and healthcare delivery. The topics include biomedical studies that lead to the development of test kits, products and clinical trials. The spectrum of research at the NIH also extends to studies on behaviour, social sciences, operational research and the burden of diseases.

The successful outcome of these research endeavours is only part of the story. Behind the scene, lies months or even years of hard work, planning and commitment from all involved, surmounting various forms of challenges, obstacles and limitations.

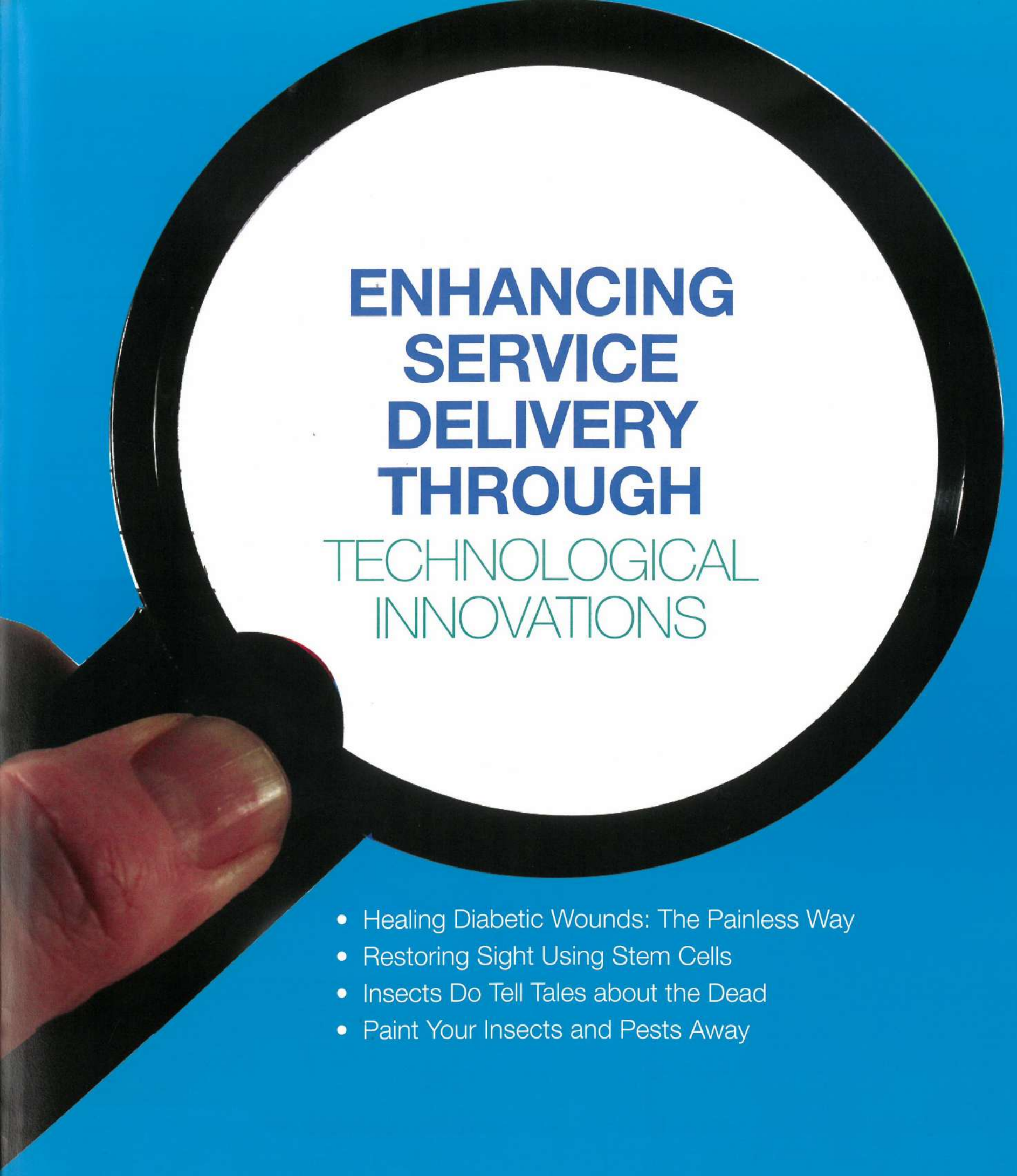
We are pleased to share some of these stories with you.

Datuk Dr. Shahnaz Murad
Deputy Director General of Health
(Research and Technical Support)

Scientists have become the **bearers** of the **torch of discovery** in our **quest** for **knowledge.**

Stephen Hawking

ENHANCING SERVICE DELIVERY THROUGH TECHNOLOGICAL INNOVATIONS



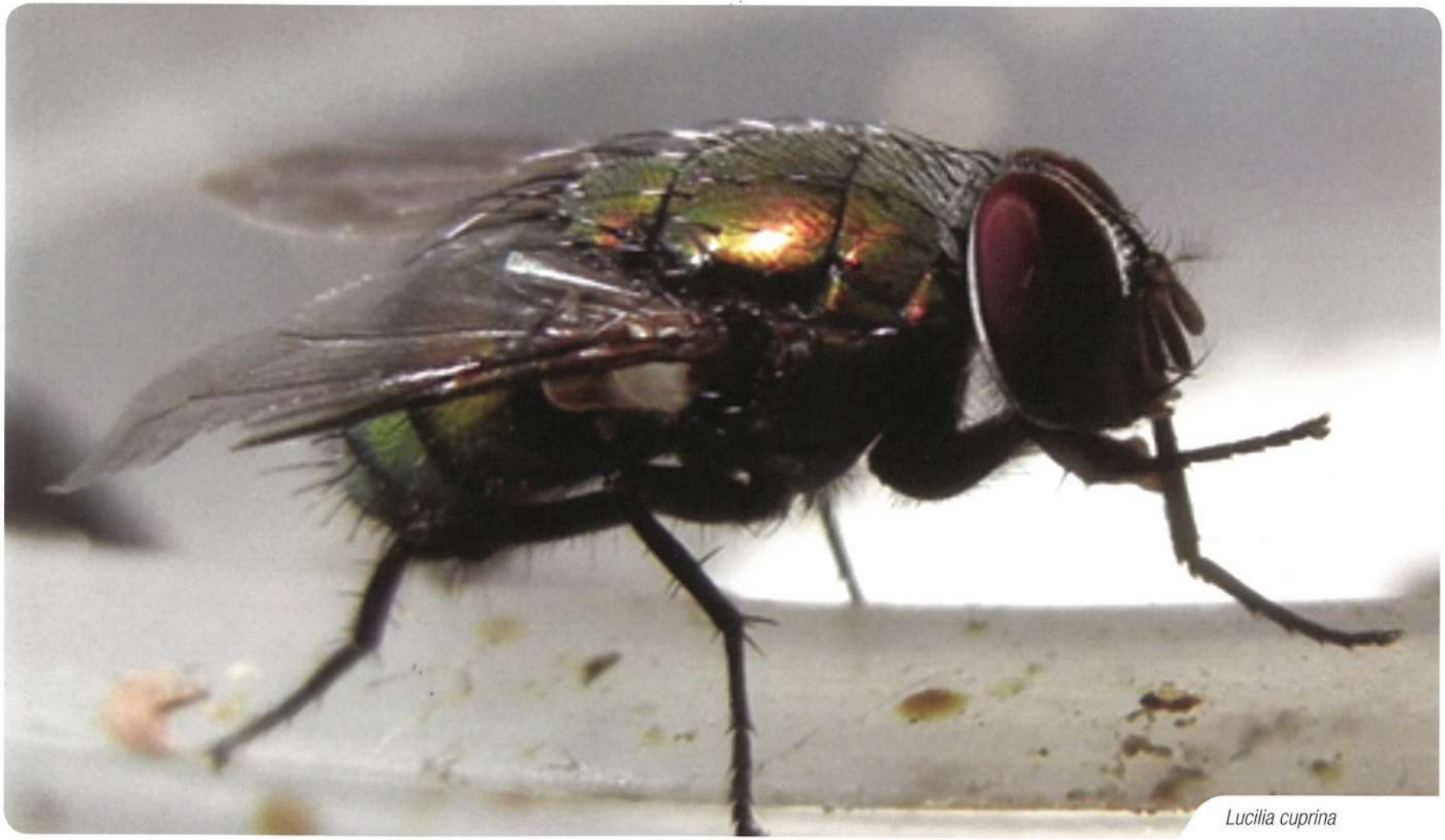
- Healing Diabetic Wounds: The Painless Way
- Restoring Sight Using Stem Cells
- Insects Do Tell Tales about the Dead
- Paint Your Insects and Pests Away

Healing Diabetic Wounds: **The Painless Way**

Nazni Wasi Ahmad, Lee Han Lim, Institute for Medical Research, Ministry of Health, Malaysia

Sometimes all it takes is a different point of view ...

The thought of flies and maggots may put some people off their food, and bring to mind disease-carrying pests. However, when faced with the task of finding a safe, effective and affordable treatment for advanced and hard-to-treat wounds, researchers at the Institute for Medical Research (IMR), in collaboration with clinicians from the Lumut Navy Hospital turned to these creepy crawlies and succeeded in finding a treatment for hard-to-treat wounds that, in most cases, would require amputation.



Lucilia cuprina

Revival of an Old Treatment

Medical treatment using maggots to clear wounds and speed up the healing process, called Maggot Debridement Therapy (MDT), is not a new method as maggots were used to treat wounds as early as the 1920's - well before the availability of antibiotics. MDT decreased in popularity but saw a revival in recent years when conventional therapy involving antibiotics failed and long queues started appearing at the only facility in the country offering the latest wound care treatment – hyperbaric oxygen therapy.

In 2003, the IMR Medical Entomology Unit initiated the research to breed maggots from the local blow fly species, *Lucilia Cuprina*. Their research team discovered an innovative way to make the fly eggs and maggots germ-free while keeping them alive and healthy to clean the wound effectively.

"When sterile maggots are applied onto the wounds, they first clean the wound by excreting enzymes which dissolve the dead and infected tissues. At the same time, they disinfect the wound and speed up the healing process."

Chronic diabetic ulcer

Left: Pre-treatment
Below: Post treatment

Eggs laid on cow liver.

20% of the Malaysian population above 30 years of age are diabetic. If 10% had diabetic ulcers that necessitated amputation, the psychological and social burden would place a heavy toll on the amputees and their families. Treatment with sterile maggots is now an option to avoid amputation.

In the Field

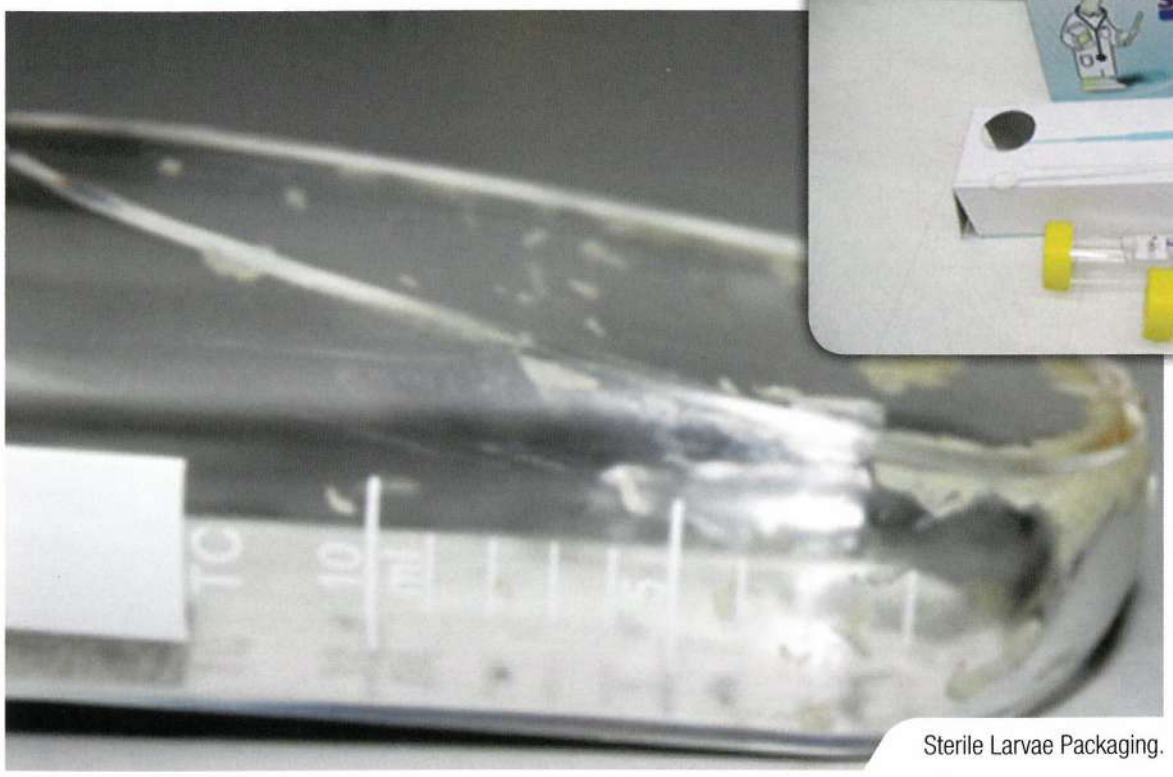
The first clinical trial was conducted at the Lumut Navy Hospital in 2004 involving 12 patients and subsequently, another trial was carried out at the Hospital Kuala Lumpur (HKL) on 30 patients. It was found that there were less amputations and shorter hospitalisation when MDT was used.

Dr. Harikrishna, a wound care specialist from HKL believes that there is potential for this therapy to be even more widely used in the country.

MDT has become a medically accepted diabetic wound care treatment available in 52 hospitals in Malaysia. To date, more than 3,500 patients have benefited and were able to avoid amputation because of these tiny creatures.

Overcoming Challenges

Despite initial setbacks, the team succeeded in securing funding from the then Ministry of Science, Technology and Innovation (MOSTI), the Ministry of Health (MOH) and the Malaysian Technology Development Corporation (MTDC). Through perseverance, the team overcame some technical challenges. These included ensuring the sterility of the larvae and developing an ideal packaging to transport the maggots in ready-to-use conditions.



Sterile Larvae Packaging.

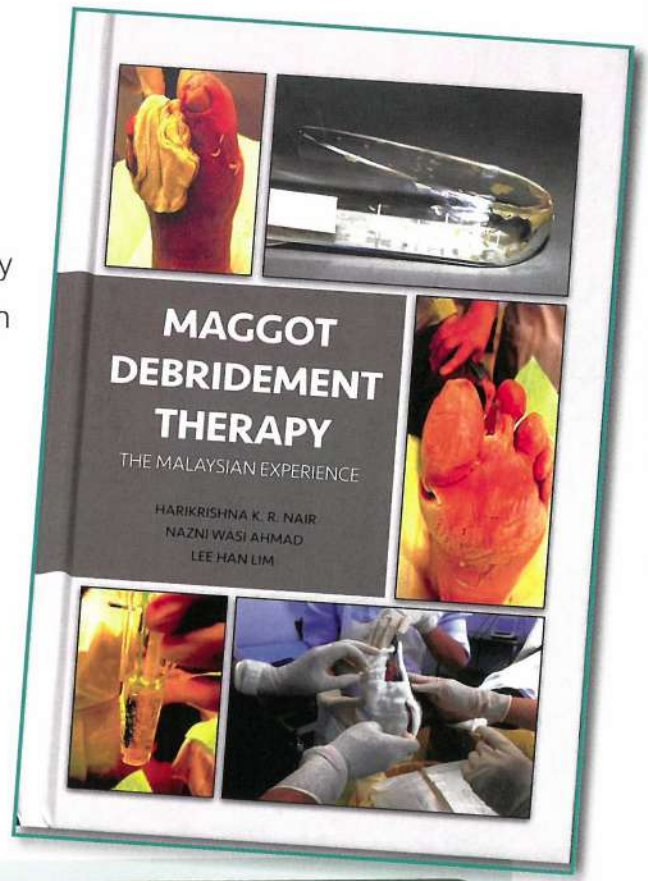
Above: Packaging of sterile maggot for treatment of diabetic ulcers.

The research has won accolades which include the National Innovation Award in 2012 and the Best Health TV Programme by Majalah 3 (TV3) in June 2011. The project has been granted a Bionexus status. The maggots are now classified as a Medical Device and the process has obtained a Halal Certification by JAKIM and is considered al-Umum al-Balwa. This research has resulted in the filing of three patents.

A Limb-Saving Industry

The researchers have teamed up with industry partners to commercially produce the maggots and create a new wealth-generating industry in line with the government's policy.

Ten years on, MDT is now being used for treating pressure ulcers, burns, venous stasis ulcers, osteomyelitis, Methicillin-Resistant Staphylococcus Aureus (MRSA) infected wounds and chronic non-healing ulcers. It has saved the limbs of thousands of Malaysians and has created a technology worthy of exporting to other countries.



Case 1

Case 2

Restoring Sights
Using Stem Cells

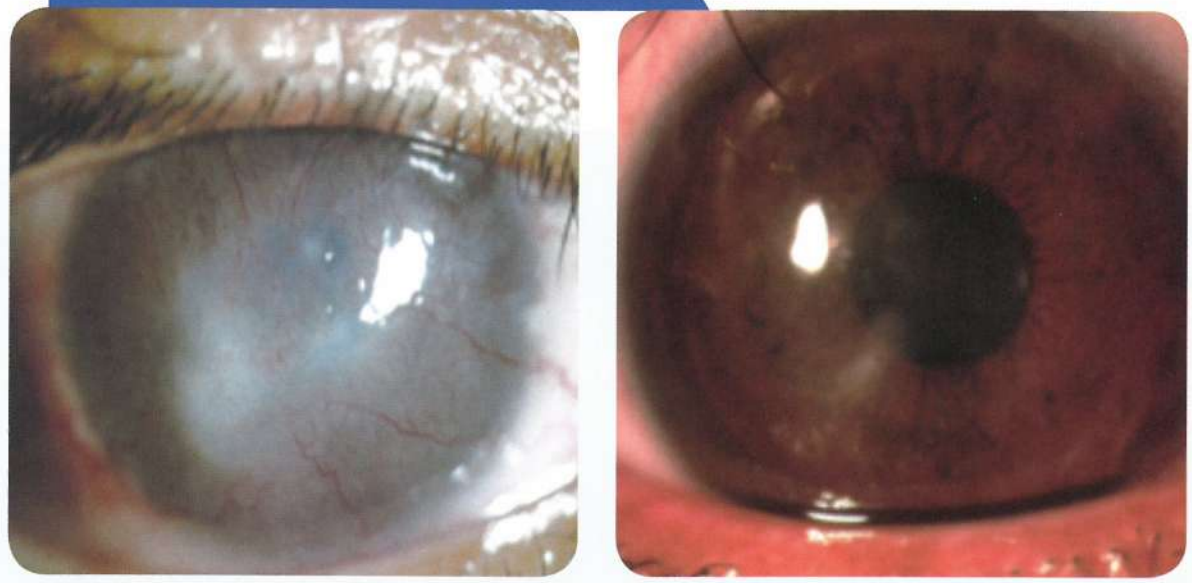
Lim Moon Nian[1], Zubaidah Zakaria[1], Thiageswari Umapathy[2]
[1]Institute for Medical Research, [2]Hospital Kuala Lumpur, Ministry of Health, Malaysia

Successful Partnership

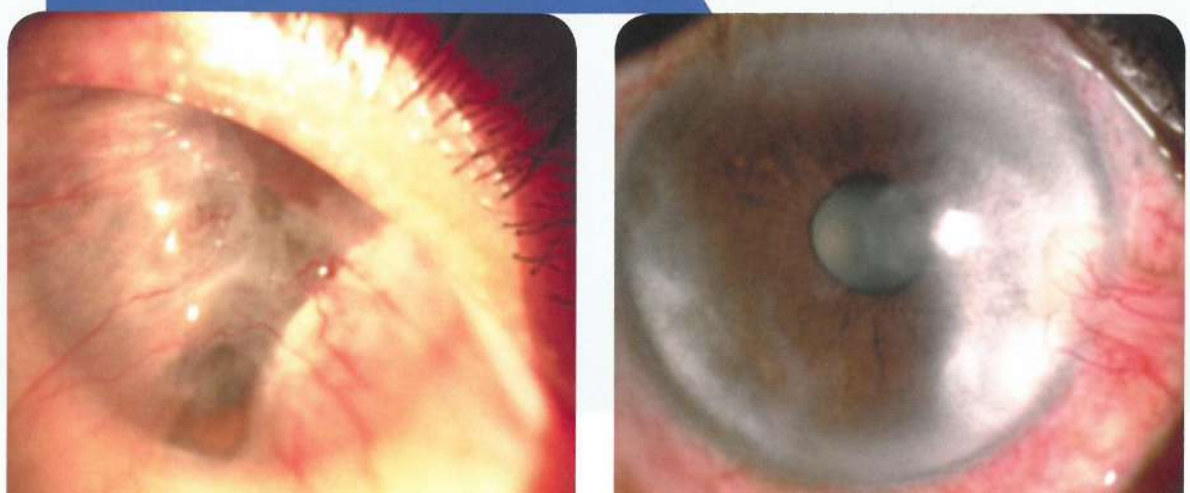
This study represents an investigator-initiated trial established through the dedicated commitment and common interest of an ophthalmologist, a pathologist and a scientist. They embarked on a translational research on Corneal Limbal Epithelial Transplantation (CLET) to cultivate corneal epithelial stem cells for transplantation.

"Corneal epithelial stem cells are located between the cornea and conjunctiva in the eye region. These cells maintain the integrity and function of ocular surface. Damage to the corneal epithelial stem cells caused by chemical and thermal burns will cause severe eye diseases that may lead to blindness."

a) Pre and post-CLET for chemical injury



b) Pre and post-CLET for advanced pterygium



Dr. Lim Moon Nian, Dr. Thiageswari Umapathy and Prof. Dr. Geeta K. Vemuganti at the LV Prasad Eye Institute, Hyderabad, India, 2007.

Before embarking on the trial, Dr Thiageswari and Dr Lim obtained cell culture and clinical transplantation training at the Stem Cell Laboratory in LV Prasad Eye Institute in Hyderabad, India. There, the researchers learned how to grow and characterise corneal epithelial stem cells on amniotic lining and brought back the invaluable skill to Malaysia. The method had successfully been adapted to the Malaysian context using amniotic membrane procured from the Obstetrics and Gynaecology Department, HKL by the late Dr S Thillanathan and was published in the Medical Journal of Malaysia. However, cultivating corneal epithelial stem cells to be transplanted to patients was not easy, according to the researchers. To ensure a low risk of contamination, the corneal epithelial stem cells had to be grown in a laboratory with Good Manufacturing Practice (GMP) accreditation.

A Sight Restored

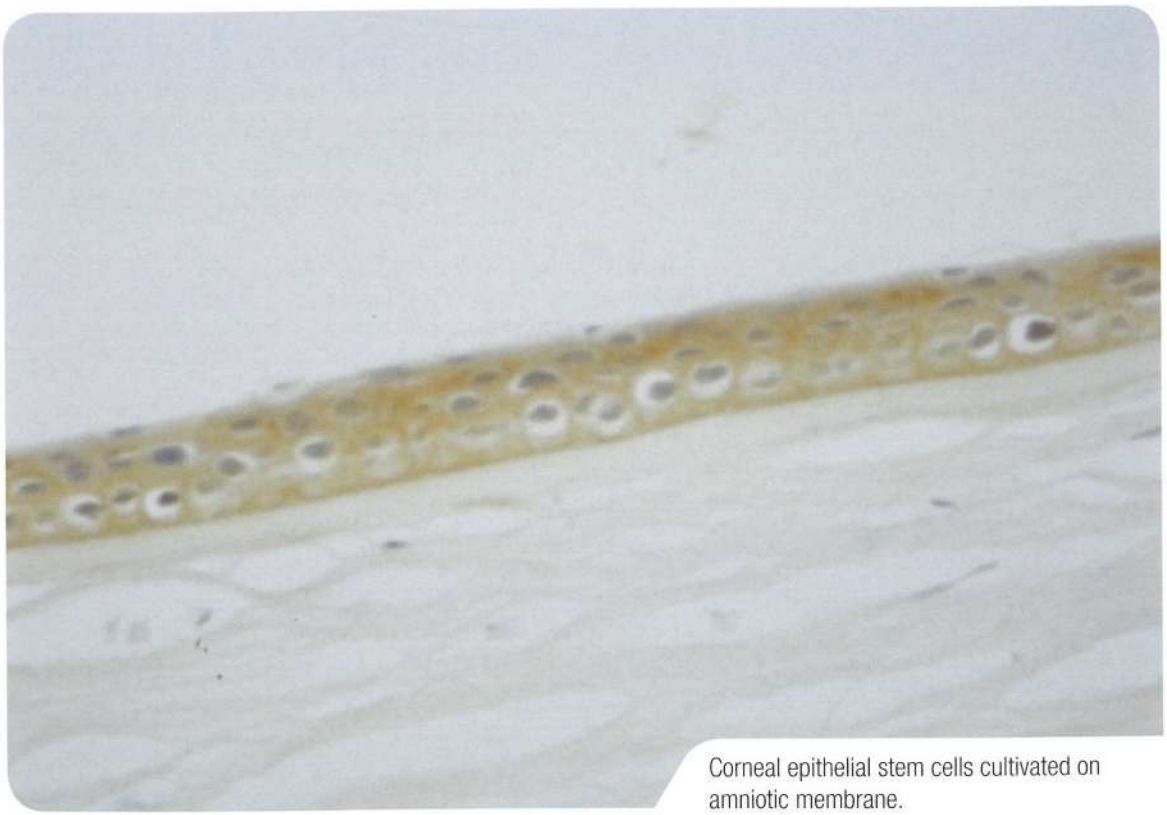
On 15 February 2012, AS (not his real name) who had previously been blinded by a chemical injury to his right eye, became the first patient in Malaysia to have a corneal transplant using his own cultivated corneal epithelial stem cells. He was one of the fourteen Limbal Stem Cell Deficiency (LSCD) patients who were recruited for a trial conducted at HKL. Each of the patients had had one eye damaged through various causes – such as chemical burns or advanced conjunctival tissue covering the cornea.

At the end of the one-year trial, ten patients reported an improvement in their vision and were able to read at least the first two lines of the visual chart. The patients' symptoms improved and none of the patients had unfavourable outcomes such as cornea perforation or bacterial infection. The trial proved that CLET was safe and efficacious in treating LSCD, but the success rate in each case was dependent on the root cause of the disease.

> *"Until today, not many stem cell therapies work as what people claimed but autologous CLET is a good example of a promising stem cell therapy as shown by clinical evidence provided by us and other centres."*

Today, stem cell research and therapy represent a paradigm shift in how we treat patients with ocular surface disease. This trial has successfully restored sight for some blinded or partially blinded LSCD patients who were previously treated using traditional methods. However, significant challenges remain to make this expensive procedure more affordable and accessible to more Malaysians.

"This trial has since paved the way for the need for stem cell research in eye disease. It is crucial to move our medical science forward to provide cures and prevent disease and suffering. We need to make this treatment more affordable and the Ministry of Health should consider providing this therapy to those in need."



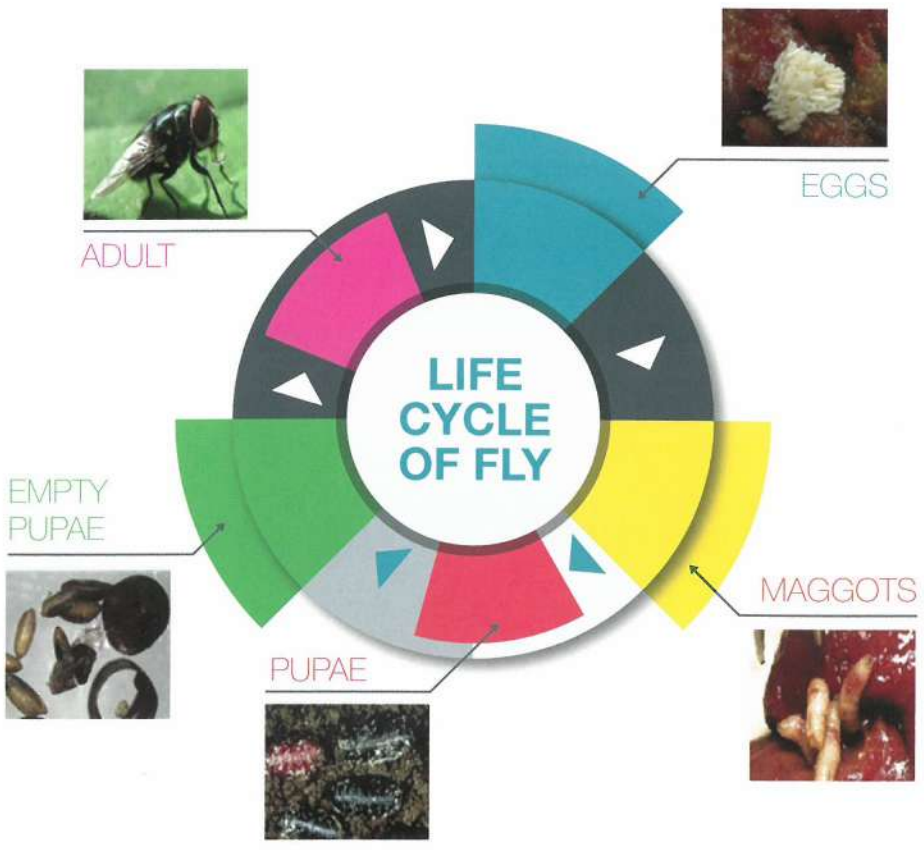
Corneal epithelial stem cells cultivated on amniotic membrane.

Insects Do Tell Tales **About the Dead**

Nazni Wasi Ahmad, Lee Han Lim, Chew Wai Kian, Khairul Asuad Mohamed, Azahari Abdul Hadi
Institute for Medical Research, Ministry of Health, Malaysia

On 12 August 2011, the police handed over three containers of maggot samples recovered from mummified remains of a female tourist to the Institute for Medical Research (IMR), Forensic Entomology Laboratory as part of their murder investigation. The 30 year old tourist had arrived on Pulau Tioman island by ferry on 10 May 2011 and disappeared shortly afterwards. Her remains were found in a cave on the island three months later. Based on the samples received, the IMR forensic entomologist successfully determined the remains to be between 3 to 6 months old, supporting an earlier report produced by a medical forensic specialist. This evidence aided the investigation in determining the time elapsed since death.

This branch of science which studies insects and uses the evidence to solve crime is called medico-legal forensic entomology.



CSI in Malaysia

Many are familiar with television programmes such as Crime Scene Investigation (CSI) featuring forensic sciences, but not many are aware that forensic entomology has been practised in Malaysia for the past 60 years. The first case was reported in 1953 by Dr. Reid from the IMR, establishing IMR's role as the country's first forensic entomology laboratory. To date, more than 1,129 medico-legal cases have benefited from the expertise of the IMR forensic entomology team.

"Flies are the first insects to arrive at a recently dead body, being attracted by the strong smell of decomposition. The next insects to appear are beetles followed by mites and moths at the later stages of decomposition. At murder scenes, flies and insects recovered from and near the dead body can help reveal the time of death, whether the body was moved, or whether drugs or toxins played a role in its cause. The insect evidence generated is admissible in courts of law worldwide."

Working the Insects in a Systematic Manner

Environmental factors and conditions under which a body was exposed may significantly influence the process of estimating time of death. Forensic entomologists help answer questions on the time, location and sometimes the method of death, even if the body was buried, burnt, drowned, hung, wrapped or found indoors, outdoors or in different altitudes.

To enable them to accurately estimate the time of death, researchers from IMR conducted several projects to systematically study the biology and life-cycles of different species of forensic flies and the arrival patterns of insects on dead bodies under different habitats and various conditions. From this, the researchers have compiled data that help in determining time of death.

When we compared the estimated time of death using forensic entomology and traditional forensic pathology, we found a 82% correlation.

Milestones in Malaysian Forensic Entomology

Another milestone in forensic entomology was created when they successfully developed a rapid and easy-to-use forensic entomology kit, backed by funding from the Malaysian Technology Development Cooperation (MTDC). This kit enabled forensic personnel to collect and process samples in a standardized manner, which is important for prosecution credibility. The forensic kit won the ITEX Gold Medal in 2013. The forensic department team at the Royal Police College continue to receive training from the IMR on maggot collection.

The IMR team has now progressed to develop a molecular taxonomy key for forensic fly identification. Molecular-based techniques are being used to identify stages before pupation (for example, eggs and first instar larvae) where conventional taxonomy keys have proved difficult. Furthermore, this technology can aid in identifying damaged specimens such as fragmented body parts, damaged adult insects, larvae, eggs, pupae, pupal skin or even specimens that have not fully developed. Molecular diagnosis has overcome issues such as poor specimen quality or delayed processing.

Real-Life CSI Heroes

The forensic work done by IMR has been featured on Astro's **"Partners in Crime: Insect Talk"**, on NTV 7's **"Forensic Entomology"** and in several local newspaper articles.

Paint Your Insects **and Pests Away**

Lee Han Lim, Nazni Wasi Ahmad, Suhana Amin
Institute for Medical Research, Ministry of Health, Malaysia

An Insecticidal Emulsion Paint

Researchers from IMR Medical Entomology Unit were tasked with developing a method to control the increasing number of vector-borne diseases, especially dengue. Various approaches had failed to control the issue, thus the researchers felt that the solution had to be practical and sustainable. When the researchers asked themselves, *"What is an effective, safe and long-lasting way to control insect pests and vectors?"* – the answer came in a lightning bolt – an insecticidal paint!

Painticide - the first insecticidal paint.

The Painticide

The IMR researchers used their knowledge to develop a tool against the pests themselves. They created a '**painticide**' from wall paint into which two chemicals were added – an insecticide (deltamethrin) and a synergist (piperonyl butoxide) to prevent insecticide-resistance development. The active ingredient, deltamethrin, has widely and safely been used as a residual wall spray since 1998 to control malaria in Malaysia and other countries; as has been recommended by the World Health Organization (WHO). This chemical is also used in bed-net impregnation for protection against malaria vectors.

What made this solution practical was the fact that most of the walls and surfaces of buildings in Malaysia are painted, for both cosmetic and protective purposes. By coating the internal and external walls of buildings such as home dwellings, hospitals and restaurants with an emulsion paint which is insecticidal, the researchers had developed a cost-effective way of controlling these insect and pests.

"What is an effective, safe and long-lasting way to control insect pests and vectors?"

Safety and Efficacy

After successfully formulating the insecticidal paint in the laboratory, experiments were carried out to test the efficacy of the paint against all common insects, using methods developed by the WHO. A normal painting of the insecticidal paint on wood or cement surface resulted in the death of the test mosquitoes such as *Aedes Aegypti, Aedes Albopictus, Anopheles Maculatus* and *Culex Quinquefasciatus*, and in the housefly *Musca Domestica*. The initial killing effect on the German cockroach, *Blattella Germanica* was generally low but this gradually increased to high death rates after several weeks. The killing effect lasted more than two years in laboratory tests due to the residual contact characteristics of the paint.

In the field, a scaled down test in a small kitchen (14' x 7') resulted in 3 years control of cockroaches, houseflies, ants and lizards. The researchers recalled that the worker, while painting, had noticed a large number of cockroaches emerging from their hidden places. Due to the potent **"flushing out"** effect of deltamethrin, the cockroaches subsequently died after being knocked out by the insecticidal paint.

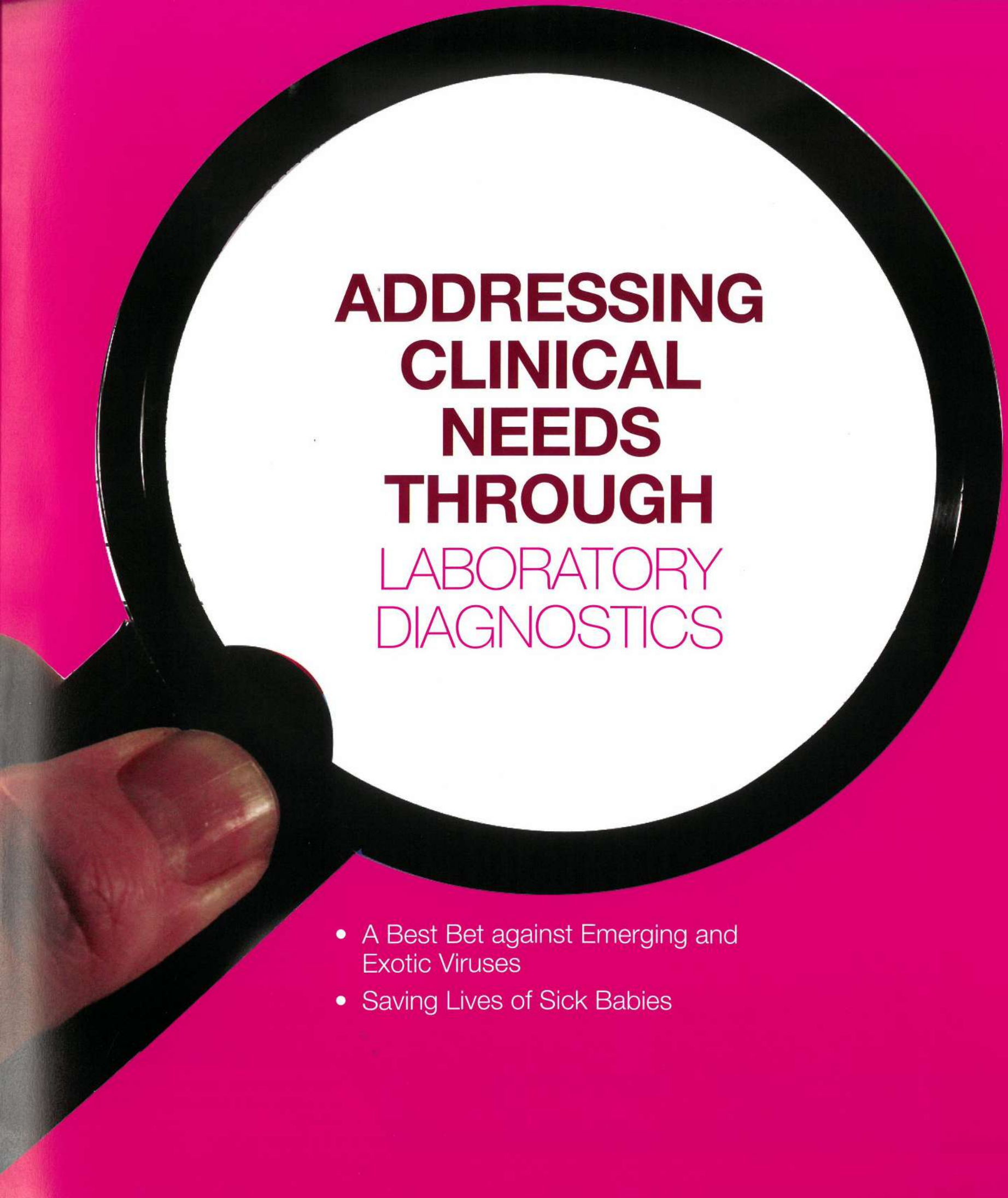
The insecticidal paint has proven to be effective and long-lasting. Application of the paint is the same as normal painting without any need for special spraying equipment or skills. More importantly, the paint is safe as no insecticide droplet or fog is released into the air, which also reduces the chance of environmental pollution.

Public-Private Partnership

IMR now has an important tool to combat vector-borne diseases in its hands and is keen to make this product available to the general public. Hampered by the inability to mass-produce the insecticidal paint themselves, the IMR is now collaborating with a major local paint manufacturer to commercialise the paint.

Painticide exhibition booth visited by the Hon. Prime Minister of Malaysia, Wealth Creation Programme Launch, 2011.

ADDRESSING CLINICAL NEEDS THROUGH LABORATORY DIAGNOSTICS



- A Best Bet against Emerging and Exotic Viruses
- Saving Lives of Sick Babies

A Best Bet against Emerging **and Exotic Viruses**

Ravindran Thayan, T.S. Saraswathy Subramaniam, Zainah Saat
Institute for Medical Research, Ministry of Health, Malaysia

Outbreaks of rare and emerging viruses have gripped the attention of people all over the world in recent times. As in the case of Ebola virus outbreak in Western Africa, not much imagination is needed to see how quickly – and deadly – epidemics can spread if proper precautions are not taken promptly.

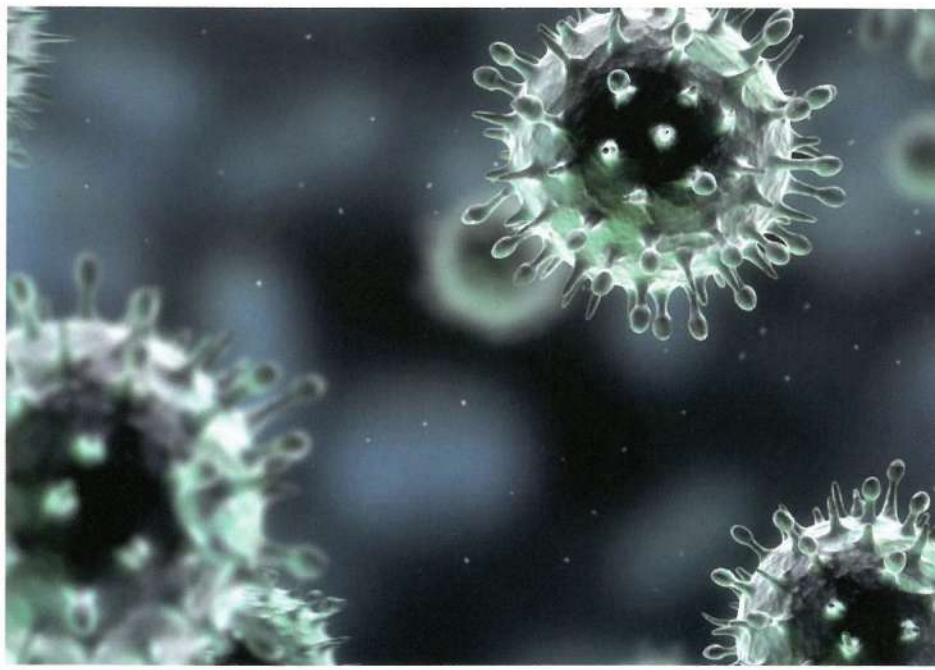
Inactivation of sample from a suspected Ebola virus disease case in a biosafety level 3 (BSL-3) laboratory.

Exotic Viruses on Malaysian Shores

In early February 2014, an elderly tourist from China was hospitalized in the Intensive Care Unit of a local hospital in Sabah. The tourist recovered and returned to China, but not before she was diagnosed with the Influenza A (H7N9) virus.

About a month later, a 54 year old man complained of breathing difficulties after returning to Melaka from performing the Umrah in Makkah, Saudi Arabia. He succumbed to his illness after three days of hospitalization. He was later found to be infected with the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) virus.

The rapid identification of the viruses by the IMR team enabled implementation of preventive and control measures by healthcare professionals that controlled the spread of these deadly, infectious viruses in Malaysia and surrounding regions.



Middle East Respiratory Syndrome Coronavirus.

Detecting Ebola

Following reports of outbreaks in Western Africa, IMR was placed on high alert, and was prepared for possible cases of Ebola in the country. The IMR reached out to the network of National Public Health Laboratory (NPHL) to provide training on the handling of suspected and confirmed Ebola virus specimens and the identification of the virus. Nine hospital laboratories were given additional training to enable laboratory testing to be performed more stringently and ensure biosafety requirements are met.

This preparation proved to be invaluable when the first suspected Ebola virus sample arrived in IMR on 3rd September 2014, and was subsequently found to be negative for the virus. Since then, this working partnership between the IMR and NPHL has found 11 subsequent suspected samples to be negative for Ebola virus.

Keeping Up With The Times

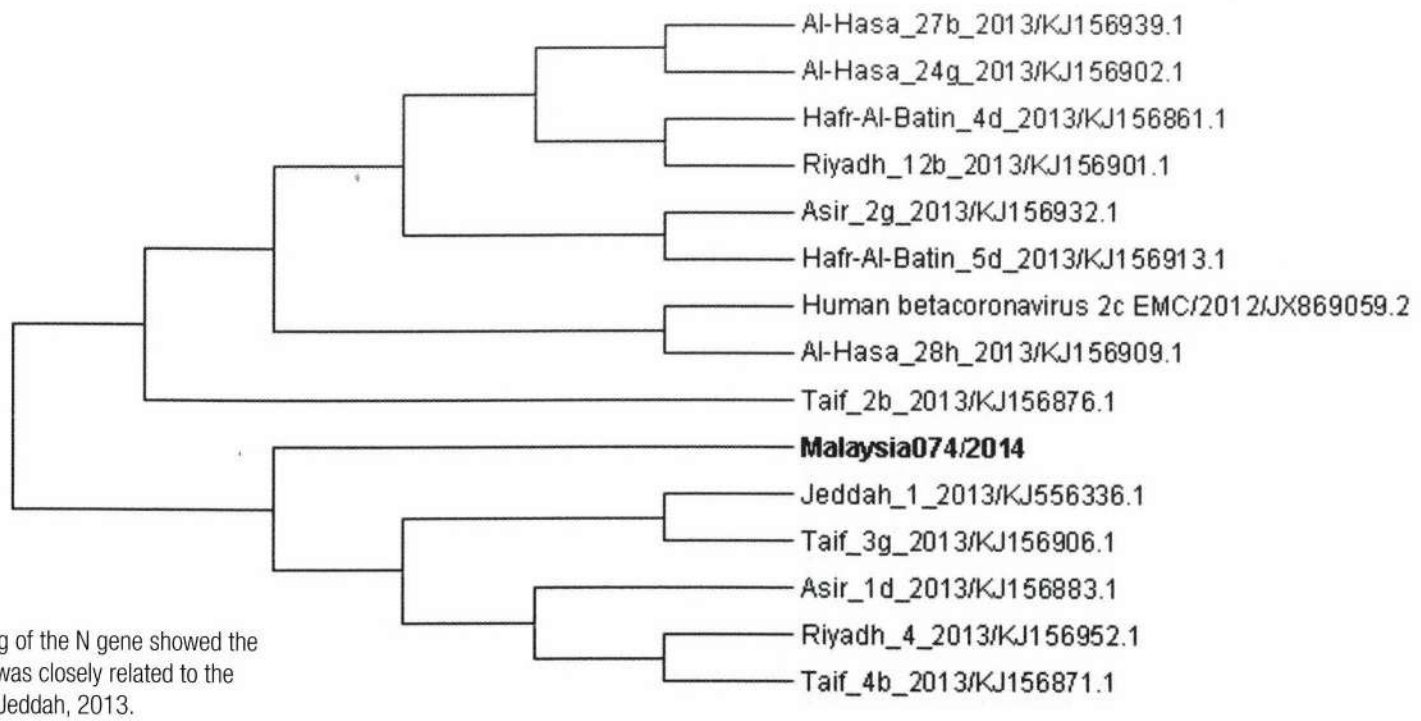
Since 2011, IMR Virology Unit had proactively set up a laboratory to prepare for exotic disease surveillance and to carry out investigations.

> *We learnt from our past experiences not to be over-dependent on international reference laboratories and to be self-reliant to enable faster detection of infectious agents.*

The Unit was trained and equipped to handle and detect various exotic viruses promptly and accurately. A quality assurance programme is in place and continuous training is also given to staff not routinely involved in outbreak investigation so that they may be re-deployed in the event of surges in cases. The Unit is available 24/7 for any urgent laboratory investigations. The laboratory has the capacity to detect among others – Zika, Rabies, Ebola, St Louis Encephalitis, Yellow Fever and also Influenza A from H1 to H15.

Re-Emergence of Zika in Malaysia

The last documented reports of zika in Malaysia were in 1966 and 2014. Then, when cases of microcephaly associated with zika viral infections grabbed worldwide media attention in October 2015, the Virology Unit have immediately started screening for zika among patients with dengue-like symptoms but were dengue negative by laboratory tests. It was not a difficult task as the assay has been optimised. In addition to diagnosis, the Virology Unit was entrusted to characterise zika virus among local patients by sequencing. It was interesting to note the presence of two sub groups within the Asian lineage, one closer to the Micronesian strain suggesting local transmission and another closer to French Polynesian strain.



Partial sequencing of the N gene showed the Malaysian strain was closely related to the strain isolated in Jeddah, 2013.

In the case of the MERS-CoV and H7N9 viruses, IMR was able to further identify the strain of the virus by looking into the RNA of the virus. Usually reserved for processing by the most advanced of laboratories, virus strain investigation is a very important step of outbreak investigation that enables researchers to better understand the nature and origin of the virus. The Malaysian strain was found to be almost identical to those found in Qatari and Saudi Arabian camels, and also belonged to the same group of MERS-CoV isolated from other human cases reported as far as Greece and USA in 2014. The H7N9 virus, on the other hand, was closely related to the strains from Guangzhou and Guandong, and was fortunately, not resistant to drugs.

Molecular Lab in Virology Unit, IMR.

Hands-on training on MERS-CoV and Influenza viruses rRT-PCR for 14 State Hospitals, NPHL and PHL in June 2013.

Some of the research has resulted in the development of new technology for rapid diagnosis of viruses. The Unit has also developed a simple, cost effective and rapid method for detecting and monitoring drug (Oseltamivir) resistance in H1N1 virus and continues to monitor drug resistance and genetic mutation in locally found viruses.

As a centre of excellence, the IMR networks and collaborators range from renowned establishments such as the USA Centre for Disease Control and Prevention, WHO Collaborating Centre for Influenza in Australia and the Institute for Tropical Medicine in Japan.

Saving Lives of **Sick Babies**

Zabedah Md Yunus, Institute for Medical Research, Ministry of Health, Malaysia

Baby Sara was born full-term and healthy to a young couple who were first cousins. However, a week later, **Baby Sara** developed lethargy, frequent vomiting and poor sucking. Upon further investigations, her brain was found to be swollen and there was an increased amount of acids in her blood. Her condition took a turn for the worse when she developed seizures and breathing problems.

Suspecting Baby Sara to have Inborn Errors of Metabolism (IEM), a type of genetic disease, doctors sent her blood sample to the Institute for Medical Research (IMR) Biochemistry Unit. Results came back within a week, positive for Maple Syrup Urine Disease (MSUD) – a type of IEM.

In babies born with MSUD, such as **Baby Sara**, there is an inability to digest certain types of amino acids due to a lack of a specific enzyme. Her diet was changed from breast milk to a special milk formula, which is free from three amino acids, namely, leucine, isoleucine and valine. **Baby Sara** eventually made a full recovery.

Inborn Errors of Metabolism is a group of genetic disorders which affect the metabolic pathways in the body. It affects around 1:3000-5000 babies worldwide. Due to defects in enzymes or other proteins, the body is unable to breakdown parts of food and turn it into energy. A food product that is not broken down into energy can build up in the body and cause a wide array of symptoms. Infants who are not diagnosed or left untreated, depending on the severity of the enzyme deficiency, may suffer from mental retardation, seizures, developmental delay or even death.

A baby with IEM undergoing dialysis to remove excessive blood acids.

Making a Prompt Diagnosis

Baby Sara might not have been able to receive a diagnosis as promptly or as affordable as it is today. It would have taken doctors at least two weeks to obtain a confirmatory result, that is, if the samples had been sent to be tested in a laboratory in Australia or Singapore. The availability of this specialized test in IMR, newborns could now be tested for and diagnosed with IEM in a matter of days.

This case highlights the significant impact of this advanced specialized testing in saving lives of babies suspected to have IEM.

Tandem Mass Spectrometry used for rapid screening of IEM.

Home Grown IEM Tests

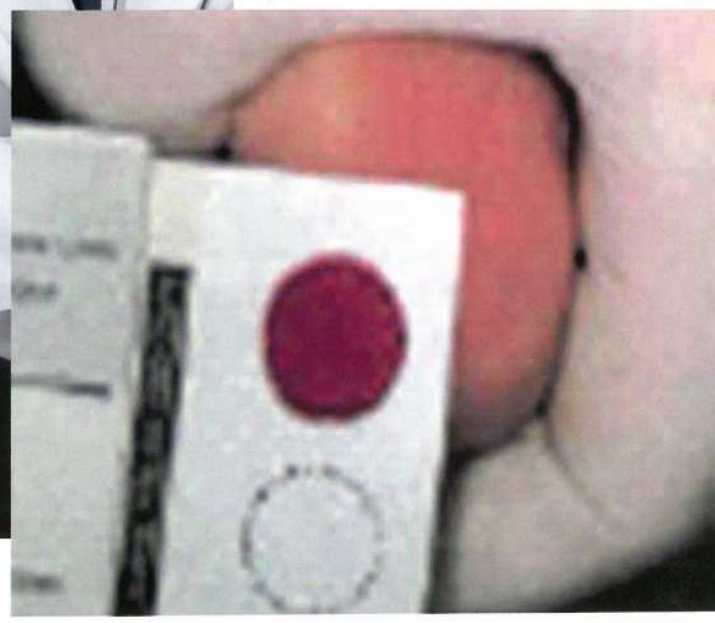
In 2003, funds were allocated for the development of IEM tests by the Ministry of Health. IMR first collaborated with clinicians and researchers from Australia to learn the various testing techniques. Then, armed with the necessary laboratory equipment, IMR proceeded to successfully develop more than 50 new biochemical genetic methods and 92 types of molecular analysis for IEM. For the first time, these tests are widely available to newborn in Malaysia.

The rapid screening method allows for simultaneous detection of more than 20 types of IEM within two hours. IMR screens close to 8000 blood samples for acute IEM yearly. This significantly cuts costs and saves time in comparison to the previous practice of sending samples overseas. More importantly, the numbers show the accomplishments and benefits of having this test available locally.

Moving Borders

IMR is the sole provider of this service for both public and private healthcare sectors in Malaysia. It is the first laboratory in South East Asia to offer 50 biochemical genetics testing to diagnose most IEMs. Requests for the tests have been received from countries such as Indonesia and Pakistan.

In tandem with the Institute's commitment to technology and knowledge transfer, the IMR has organized workshops and training sessions on the diagnostic techniques for analysis of amino acids and organic acids. These training sessions have enabled the setting up of this specialized diagnostic service at the Paediatric Laboratory at Kuala Lumpur Hospital in 2004 and the Central Diagnostic Laboratory at the University of Malaya Medical Centre in 2006. IMR moved beyond borders when the Institute helped the Aga Khan University to develop Pakistan's first IEM laboratory.

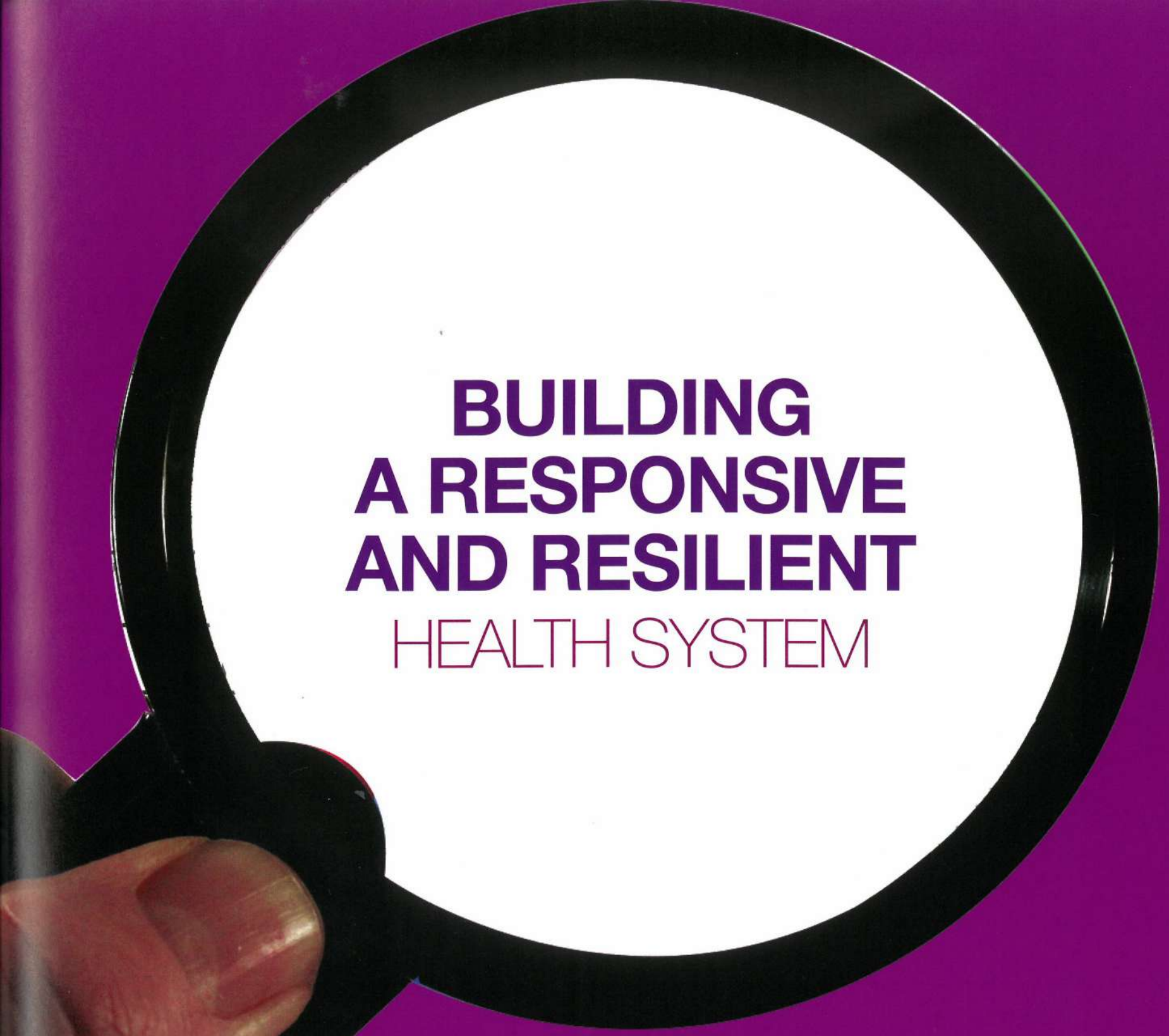


Blood of neonate obtained from heel-prick collected on filter paper for rapid screening of IEM.

To raise
new questions,
new possibilities
to regard old problem
from a new angle,
requires **creative**
imagination and
marks real advance
in science.

Albert Einstein

BUILDING A RESPONSIVE AND RESILIENT HEALTH SYSTEM



- Critical Lab Values: A Phone Call Keeps the Danger at Bay
- Primary Care: A Pragmatic, Low-Cost Intervention in Patient Safety
- Vaccination in Malaysia: Protecting Our Children
- Patients' Unvoiced Needs: A Community Trial in Outpatient Setting
- Ensuring Safe Food for Hospitalised Patients
- Reducing the Incidence of Dispensing Error

Critical Lab Values: **A Phone Call Keeps the Danger at Bay**

Lily Manorammah[1], Tengku Norita Tengku Yazid[2], Noor Aishah Mohd Dawi[1], Shalini Selvarajah[3], Low Lee Lan[3], Keah Kwee Chu[4], Habibah Bee[1], Roslinah Ali[3], Ainul Nadziha Mohd Hanafiah[3], Adilius Manual[3], Suria Junus[3], Mohd Sadek Yasin[5], Irdayu Hairani[3], Maimunah A. Hamid[6], Muhd Zulfadli Hafiz bin Ismail[3], Sondi Sararaks[3]
[1]Hospital Kuala Lumpur, [2]Hospital Selayang, [3]Institute for Health Systems Research, [4]Hospital Penang, [5]Hospital Kangar, [6]Previously at the Office of the Deputy Director General of Health (Research & Technical Support), Ministry of Health, Malaysia

"What is it for?" A patient anxiously asked as a doctor took a blood sample from him. *"We are monitoring your blood sugar level, Sir."* Half an hour later, the doctor hurriedly approached the patient. *"Sir, I just received a phone call from the lab about your test result and we must start the treatment immediately."*

Before 2007, there was a possibility of patients not getting the immediate attention they required due to **"poor"** notification of critical laboratory results at healthcare facilities.

Critical Value or Normal Ranges?

Critical laboratory value is defined as *"a laboratory result within critical limit indicating the patient is in imminent danger unless appropriate therapy is initiated promptly"*. In such cases, patients require immediate medical intervention from their doctors. Illustrating this, Figure 1 illustrates the concept of critical laboratory results. At either end of the spectrum, the patient faces imminent danger.

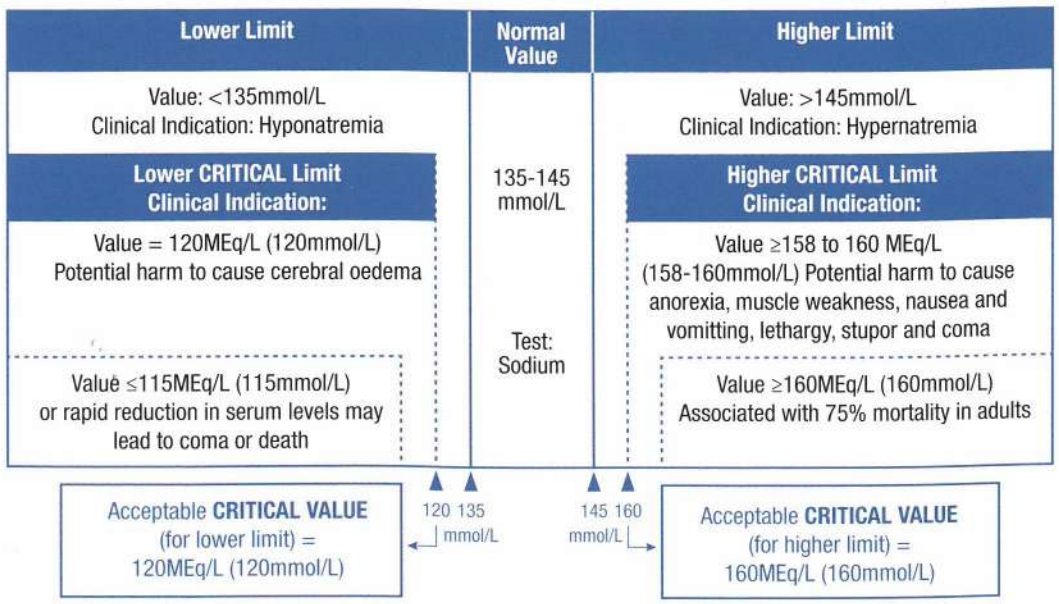


Figure 1: Using serum sodium as an example to illustrate critical limits and values.

IIn 2007, in line with the policy makers' emphasis on patient safety, the Institute for Health Systems Research (IHSR) embarked on a study to improve the notification process of critical laboratory values in collaboration with pathologists, nurses, medical laboratory technicians and scientists.

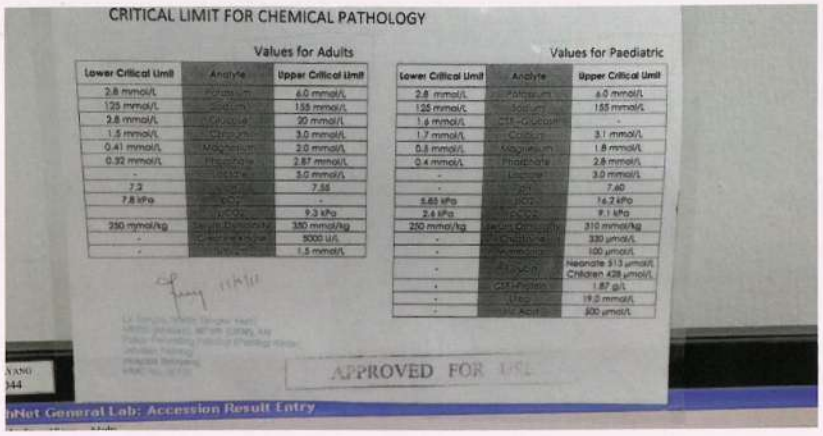
The project started by exploring the current practices of notification of critical laboratory results in most MOH hospitals. Generally, hospitals did not have guidelines on the notification of critical laboratory values, and there was no standardised list of critical laboratory values as a guideline in our country.

Addressing a Critical Need

IHSR embarked on the development of a national critical laboratory values guideline and a critical results notification procedure acceptable to both clinicians and laboratory personnel. This process took about a year to be completed, involving many experts from various fields, extensive literature search on best practice from other countries, as well as a nationwide survey involving MOH personnel.

In 2009, the standardised guidelines on notification and list of critical laboratory values were successfully developed. An intervention study was conducted using the guidelines in selected MOH hospitals showed encouraging findings whereby recognition and notification of critical values increased tremendously.

The important and potentially lifesaving findings were presented to the National Patient Safety Council Malaysia in 2009. From then on, the usage of the guideline has increased substantially, especially when the MOH health facilities have been mandated to use the guideline. To ensure a more effective uptake, the guideline was disseminated in various forms, including posters, flipcharts and quick guidelines. Hospitals have adopted, and some have adapted the guideline format to suit their needs (Figures 2 & 3).



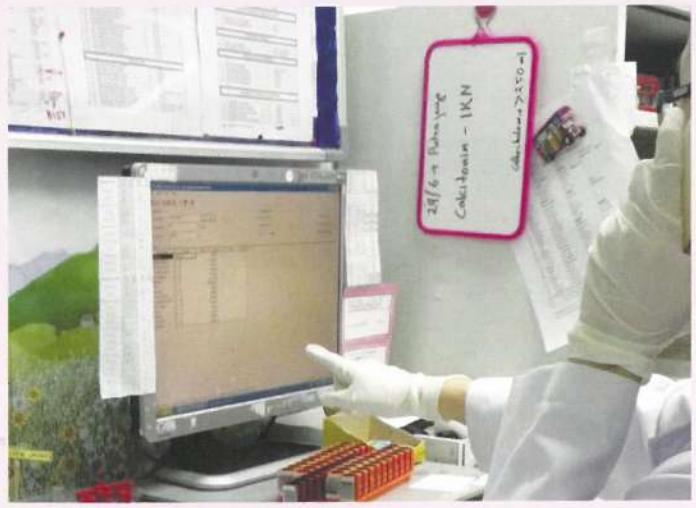
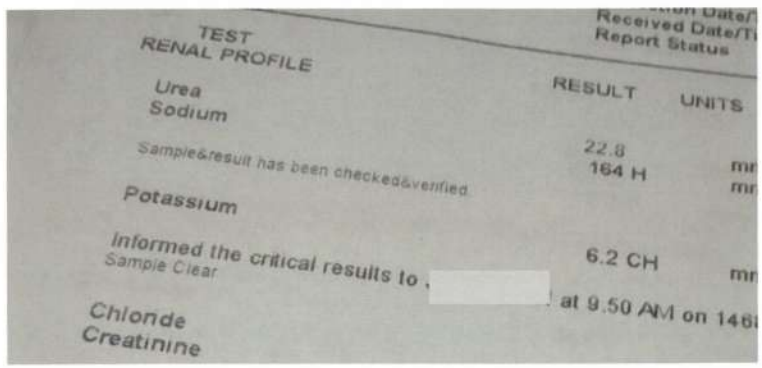


Figure 2: Adapted guideline formats used at the work station, Selayang Hospital, MOH.



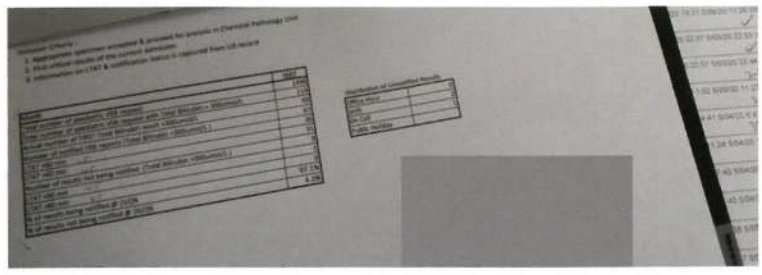
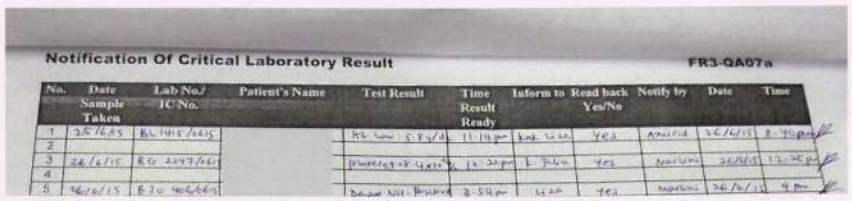
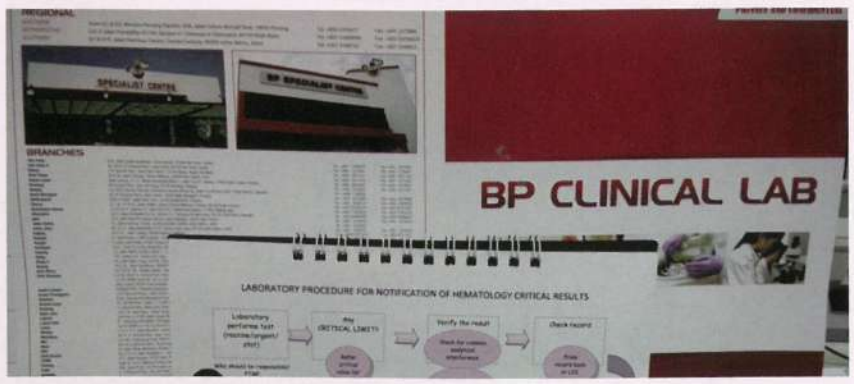


Figure 3: Critical notification in Klang Hospital, MOH.





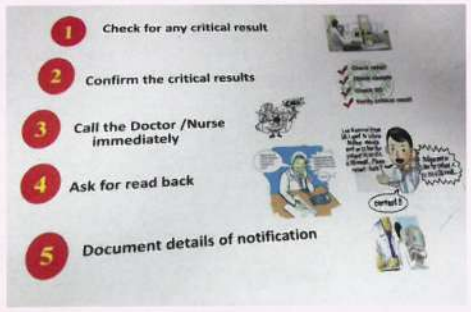


Figure 4: Notification and materials used in BP Clinical Lab.

Improving Patient Safety in Public and Private Facilities

Policy makers rapidly recognised the importance, impact and effectiveness of the guideline in improving healthcare delivery. In 2013, notification of critical laboratory result was launched as part of the Malaysian National Patient Safety Goals.

The guideline's inclusion into the patient safety goals makes it a strong recommendation to be used and more importantly, it acts as an impetus to inculcate the practice of immediate critical results notification in both private (Figure 4) and public healthcare sector

Due to the high demand for the guideline, many reprints were produced which reflects the willingness of hospitals to use the guideline (Figure 5).

What is more rewarding however, is the fact that thousands, if not millions of patients' lives could be possibly saved along the way due to this improved practice, and all these stem from the simple concept of *'a phone call keeps the danger at bay'*.

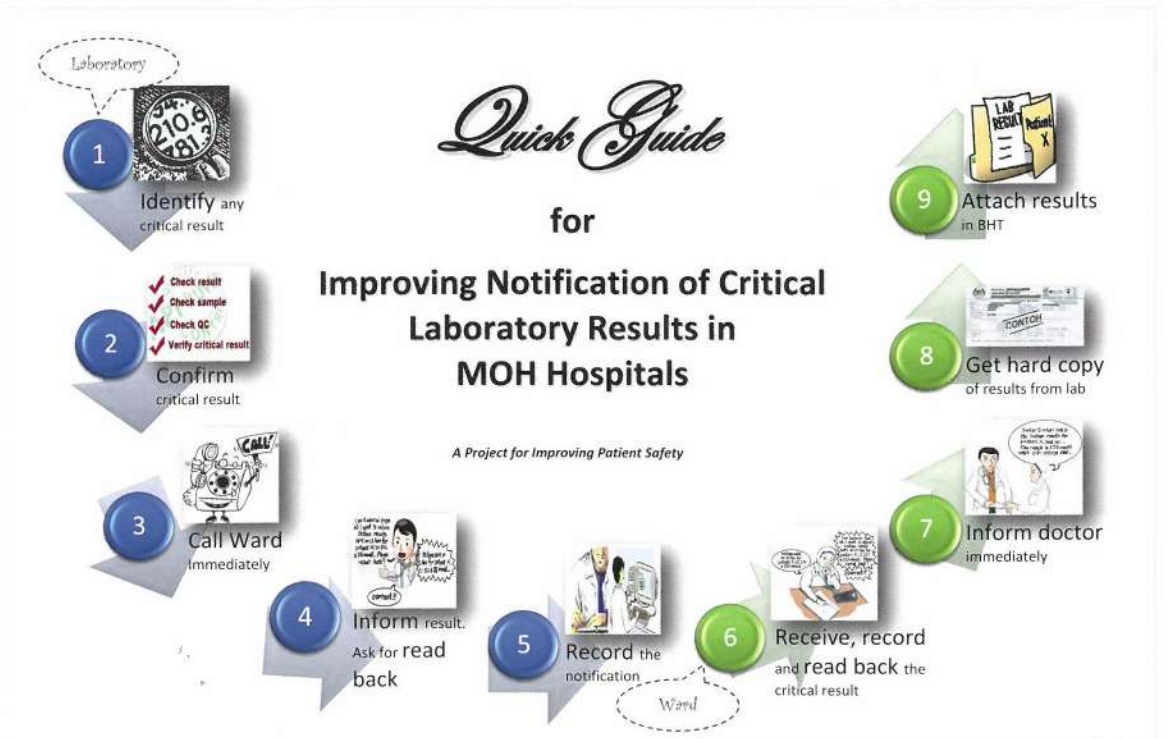


Figure 5: The Quick Guide developed by the researchers for notification of critical results.

Primary Care: **A Pragmatic, Low-cost Intervention in Patient Safety**

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A mother brought her baby to the Health Clinic because her baby had not passed motion for several days. She was very worried as the baby's abdomen was getting bigger and he had refused to drink milk. She had hoped that the doctor would be able to tell her what was wrong with her baby or perhaps referred her baby to a hospital. However, after seeing the doctor, her baby was prescribed a suppository and sent home.

Even without medical training, one could tell that there was something not quite right with the outcome of the visit to the clinic.

A team of Family Medicine Specialists (FMS), together with the Institute for Health Systems Research (IHSR), carried out a study on patient safety incidents in their efforts to improve patient care at the primary care level. Their investigation detected lapses in case management, inadequate investigations, errors in decision-making and medication errors such as inappropriate medication prescribing, as well as inadequate documentation; most of these were preventable.

A presentation of the study findings to the Deputy Director General of Health (Public Health) led to the allocation of RM0.5 million to every state Health Department in 2010 to fund training, using a study intervention package developed by the MOH aimed to improve patient safety. Response from clinicians was encouraging, and with the active involvement of the Family Health Development Division (FHDD), Ministry of Health (MOH), part of the intervention package is currently undergoing its third revision for all MOH primary care clinics.

A Low-Cost Intervention

The FMSs from the MOH and universities, together with IHSR, developed an intervention package and tested it in a controlled trial at 12 MOH clinics.

The intervention package consisted of important updates on clinical knowledge and skills for healthcare providers, clinical audits by supervisors, pharmacy safe netting, formatted medical record forms and education materials such as videos to improve clinical sign detection.

The Quick Flip Chart which serves as a fast and accessible reference for clinical management is another educational material that resulted from this research (Figure 1). This popular tool is now used throughout MOH clinics in the country, with frequent reprints and timely updates. Challenges remain, in making it relevant in todays' information technology era.

In addition to education and communication materials, training sessions to improve patient safety in the form of Continuous Medical Education (CME) were also continuously organized for healthcare providers.

Improving Patient Safety

The researchers found that vital improvement could be achieved such as preventable incidents, management errors, inadequate documentation practices and medication errors through the low-cost intervention package.

First Point of Care

Since implementation of this low-cost intervention package, health clinics have become a safer first point of contact for patients. Health clinics have provided a better standard of care and serve as referring centres for more complicated cases. By actively working through research informed by empirical observations, IHSR not only strives to protect patients from harm, but also ensures better care is provided to the public.

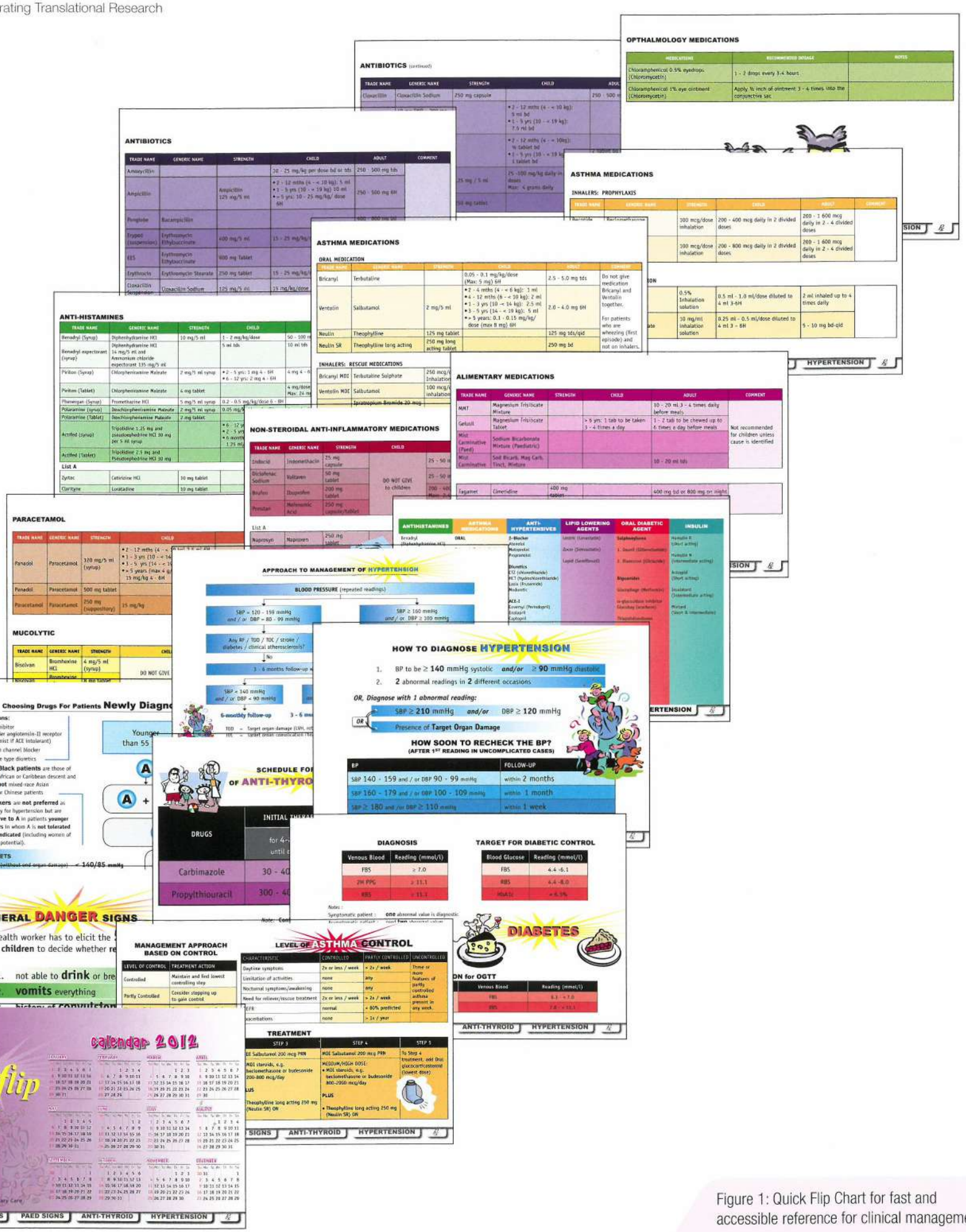

Figure 1: Quick Flip Chart for fast and accessible reference for clinical management.

Vaccination in Malaysia: **Protecting Our Children**

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The small child clutched her mother's hand tightly, knowing what was in store for her in the doctor's room. Another painful jab, she thought to herself, fervently wishing that her mother would not be leading her into the room. When their number was called, the mother brought the child in, trusting that the doctor would be administering a safe, effective vaccine to her beloved daughter, protecting her from infectious diseases. In the United States, in 2007, it was reported that more than 10,000 patients had needed revaccination after it was discovered that the vaccines which were administered were ruined by poor refrigeration techniques. The question arose: *'What is the situation in our country?'*

How Safe Are Our Vaccines?

The Institute for Health Systems Research (IHSR) conducted an interventional study on 467 private health clinics in Malaysia. They found that the majority of private clinics they visited had seemingly innocuous but possibly harmful practices. Not much care had been given to the practice of keeping vaccines in the right temperature range, potentially rendering them ineffective.

The study interim results were presented to the private clinics and the Malaysian Patient Safety Council. The possible harmful impact of poor vaccine storage practices on disease and outbreak prevention alarmed members of the Malaysian Patient Safety Council. Good vaccine storage practices exemplified in the study intervention package were widely disseminated to healthcare professionals nationwide. The Ministry of Health (MOH) subsequently went on to incorporate this interventional package as a compulsory practice in all new and existing private health clinics nationwide.

What is the Situation in MOH Clinics?

The Malaysian Patient Safety Council concurrently commissioned a similar audit for MOH clinics. The result was an urgent allocation of RM5 million to upgrade out-of-date MOH clinic refrigerators that had frost, a telling sign of possible compromised vaccine efficacy. This represents a breakthrough as previous years' requests for purchase of these refrigerators from the health facilities had never been approved, until the study.

Figure 1: Six Essential Messages for Good Vaccine Storage Practice.

Figure 2: A Reminder for Doctors in Private Practice on Vaccine Storage.

The Practical and Sustainable Intervention That Changed Practice

Change in unfavourable vaccine storage practices were successful due to the excellent intervention package, comprising health care providers training and provision of enabling resources, educational materials and incentives to the clinics.

As part of the intervention package, public health nurses taught the recommended practices to private clinics assistants during audit visits in an interactive manner. The clinics were provided with dial thermometers and temperature monitoring charts to help them monitor internal refrigerator temperature according to the proper vaccine storage practices. During audits, public health nurses verified the use of these resources and reinforce learning to the private clinics. The public health nurses were made available for troubleshooting outside of audit hours.

A series of educational materials were created for the clinics – such as a laminated card summarizing good storage practices (Figure 1), bilingual (Malay and English) power-point training module in CD-ROM, reminder stickers to reduce unnecessary refrigerator door opening, and a practical "to-do" list (Figure 2) for the providers.

Clinics with good compliance to proper storage practices were rewarded with a certificate of acceptable vaccine storage status, and a sticker stating *"My Refrigerator is Safe for Vaccines"* to inspire public confidence.

Through the active participation and alertness of the challenges, these paediatricians' research with IHSR had resulted in untold savings, with morbidity averted. Together with its network of highly motivated and engaged partners, IHSR continues to be committed to improving patient safety for all Malaysians and is focused on helping policy makers make evidence-based decisions through their research findings.

Patients' Unvoiced Needs: **A Community Trial in Outpatient Setting**

Low Lee Lan[1], Sondi Sararaks[1], Maimunah A. Hamid[2]
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You sit in the crowded waiting room, anxiously looking at the number displayed on top of the door. While waiting for your number to be called, you mentally go through the list of questions you have for the doctor. *"...must remember to ask why my knees are giving me so much pain ... must also remember to ask the doctor what it means when the nurse says I have to get my eyes check for glaucoma ..."* you thought to yourself. However, once you had met the doctor and she started asking you questions, you forgot all about the list of questions you had for your doctor.

Voicing Concerns is Crucial

This is indeed a familiar scenario for many patients - patients who have planned to ask their healthcare providers questions, but were unable to voice out their concerns during consultations due to various reasons. Is it a big problem, you might ask? After all, the doctor knows best. Clinically, it is important that doctors obtain a complete and accurate history from patients for them to do their job effectively. But more importantly, it is crucial for patients to be able to voice out their needs since it might be another three months before they get to meet the doctor again.

Recognizing the importance of helping patients to voice their concerns effectively, researchers from the Institute for Health Systems Research (IHSR) embarked on a project in 2006 to assess the situation of unvoiced needs and to develop effective interventions for the problem.

A cross-sectional study was conducted amongst patients attending five Ministry of Health (MOH) outpatient healthcare facilities to identify the extent and distribution of patients' unvoiced needs. The study revealed that half of the patients did have plans to discuss concerns with their doctors and one fifth of them were not able to do so. Among various reasons for not voicing out their problems were forgetfulness, perceptions that healthcare workers were unwilling to listen, embarrassment and nervousness, and expectations that the healthcare worker will ask them their concerns.

Finding Solutions for a Silent Problem

To address this issue, IHSR conducted a controlled non-randomized multicentre community trial in ten MOH outpatient specialist clinics and primary care clinics in 2008, to find out the most suitable intervention package that helps patients voice their needs and to assess issues following implementation.

Two intervention packages were developed. The first package consisted of a patient self-completion agenda form otherwise known as a **"Forgot to Ask"** slip and posters to promote the usage of the slip. The second intervention package comprised of an animated video with different scenarios of messages. In addition, healthcare workers were also briefed on the intervention and its implementation.

The study confirmed that not only do patients' unvoiced needs exist, but the intervention packages which were designed to be enabling and educational were effective in helping patients present their problems to healthcare providers. Although the intervention packages were not able to fully eliminate the problem, the packages did reduce the percentage of unvoiced needs among patients. Furthermore, this intervention measure enabled healthcare workers to become more aware of patients' unvoiced needs during their consultation.

Working Together to Address a Practical Need

This translational research was successful due to the dedicated teamwork among the clinicians, public health specialists and researchers who worked together to address patients' needs. The researchers based their work on knowledge translation principles from its early stages and worked hard to disseminate study findings to ensure utilization of the research findings. To date, the intervention materials have been utilized by other hospitals including other non-MOH facilities.

The findings from this study have not only benefited patients directly, but have also helped healthcare workers to understand their patients better. Through better understanding of patients' concerns about their illnesses, healthcare workers can reach a diagnosis more efficiently and provide appropriate case management and quality patient-centred care.

Intervention Components

Two intervention packages were developed and implemented:	Type of Materials
A "Forgot to Ask" (FTA) slip (Pt Self Completion Agenda Form) comprising of a question sheet with instruction. a FTA Poster – to promote the use of FTA slip. 	Enabling & Promotional
Video with different scenario of messages. 	Educational & Enabling
Poster and pamphlet (fan) to promote awareness and tips on how to reduce unvoiced needs. 	Promotional & Educational
Training for health care provider (HCP) were providing on implementation of the intervention. 	Educational Materials
Additional materials for HCP – **Note books and stick-on notes** awareness on unvoiced needs were distributed to HCP and counter staff. 	Promotional Materials


MOST OF PATIENTS COME TO US THAT NEED EXPLANATION; WE ALWAYS TALK TO THE PATIENTS AND EXPLAIN WHAT THEIR PROBLEMS ARE. I DIDN'T SEE THE PROBLEM BECAUSE WE ALWAYS TALK TO THE PATIENT.
WHAT WE'LL DO IS WE TALK, PATIENT QUIET FIRST, AND THEN AFTER THAT WE STOP AND WE ASK THEM, ANYTHING ELSE THAT YOU WANT TO KNOW.
SOMETIMES WHEN WE CONCENTRATED ON SOMETHING, OTHER THINGS COULD NOT REMEMBER. SOMETIMES ONCE THE DOCTOR TALKED, WE COULD NOT EVEN INTERVENE.
SOMETIMES WE HAD FORGOTTEN BY THE TIME WE SAW THE DOCTOR THOUGH WHEN AT HOME WE PLANNED TO TELL THE DOCTOR. WHEN THE DOCTOR ASKED OTHER THINGS, WE HAD FORGOTTEN WHAT WE WANTED TO SAY EARLIER...
WE HAD MANY IDEAS WHILE WAITING FOR THE DOCTOR BUT WHEN WE SAW DOCTOR SOMETIMES WE FORGOT. WHEN THE DOCTOR TALKED ABOUT OTHER ISSUES, STRAIGHT AWAY WE FORGOT (TO ASK).

Ensuring Safe Food for **Hospitalised Patient**

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[1]Institute for Health Systems Research, [2]Institute for Public Health, [3]Hospital Queen Elizabeth, [4]Hospital Kuala Lumpur, Ministry of Health, Malaysia

There is a saying that the kitchen is the heart of a home. Likewise, in a hospital, the kitchen is also the heart of the institution, providing much-needed sustenance to ill patients, indirectly helping with the healing and recuperation process. Therefore, the provision of safe food to hospitalised patients is an important aspect of quality patient care. Increasing occurrence of physical food contamination such as cockroaches, mold, worms and hair started appearing in hospital food. In 2006, 186 cases were reported to the MOH which triggered the policy-makers and researchers from the MOH, Dietetics Department and the Institute for Health Systems Research (IHSR) decided to take action.

Before, there was no existing structured food safety programme implemented in any MOH hospitals, except for the states of Selangor and Perak. So, the MOH and the Dietetics Department, with the help of researchers from IHSR decided to embark on a study to find strategies to eliminate physical food contamination in rice, vegetables and bread. The researchers first assessed the knowledge and practice of staff involved in the food chain as well as their compliance level to food safety using critical control points.

Situational Analysis

The researchers visited ten hospitals throughout Malaysia to observe food handling practices for rice, vegetables and bread. Self-administered questionnaires were distributed to kitchen staff stationed in all parts of the supply chain, from food preparation to food delivery to test their knowledge, attitude and practice. The study revealed a low level of knowledge on food handling among food handlers as well as a lack of standard protocol for food preparation and handling in those hospitals. It was also found that most of the kitchen appliances were outdated; some were inappropriate or inadequate for food preparation. The study also found raw materials such as rice to be of lower grade and poor quality.

Improving the Situation

Two sets of interventions aimed at food handlers including the cooks were then developed to address all these shortcomings. The first involved a set of posters on hygienic food practices. The second consisted of educational digital materials such as power point presentations and video compact discs focusing on the standard operating procedures for food preparation, personal and facility hygiene. Post-intervention, the researchers found a decrease in the incidence of physical contamination in food served to patients and an increased awareness of the importance of personal hygiene among the food handlers.

Putting Safety Procedures in Place

This study brought to the fore the constraints faced by the food service department, such as lack of appropriate equipment and use of low quality raw materials. These findings were presented to the top management and this resulted in a change of policy. For instance, better quality rice is now used, best practices and standard operating procedures for safe food handling are adopted in hospital kitchens. The researchers intend to continue their investigation of food safety into other types of food such as meat and drinks, and also assess the sustainability of interventions. After all, safer food leads to healthier patients.

Reducing the Incidence of **Dispensing Error**

Nour Hanah Othman[1], Kamarunnesa Mokhtar Ahmad[2], Nur'Ain Shuhaila Shohaimi[2], Suzana Shamsuddin[2], Syuhaida Mohd Yasin[2], Siti Haniza Mahmud[3]
[1]Hospital Kuala Lumpur, [2]Pharmaceutical Services Division, [3]Institute for Health Systems Research, Ministry of Health, Malaysia

A normal routine for a patient in a clinic usually involves registration at the counter, consultation with the doctor, laboratory tests if necessary and perhaps, a review with the doctor. This is more often than not, followed by a visit to the outpatient pharmacy to pick up medications based on the doctor's prescription. Errors may occur at any point during this process, and an error involving the dispensing of medication at the outpatient pharmacy is, unfortunately, not an exception.

Spotting Errors

What are the types of errors that occur during dispensing, one might ask? Common errors involve the erroneous selection of medications from the shelves and also the wrongful labelling of intake instructions, patients' names or dosage. Thankfully, most of these errors are spotted before the medications leave the pharmacist's counter.

With an average of 10.1 million to 12.7 million prescriptions received at the Ministry of Health (MOH) outpatient pharmacies between 2005 and 2007, it is not surprising that the Pharmaceutical Services Division of the MOH is keen to ensure that dispensing errors do not happen in the first place. Thus, in collaboration with the Institute for Health Systems Research (IHSR), officers from both the institutions set out to identify possible interventions that could reduce dispensing errors. Findings from the study should serve to inform decision-makers on effective interventions that could be implemented in MOH pharmacies.

Search for Effective Strategies

For the study, the researchers selected three government hospitals with the highest error incidences in 2007. Prior to the intervention, a total of 350 (0.36%) potential dispensing errors were recorded from a total of 97,894 prescriptions in the study sites. Three strategies to reduce dispensing errors were introduced in these hospitals and each hospital was encouraged to implement all the three interventions. However, if that was not possible, they were free to choose any two out of the three interventions which were appropriate for implementation at their facilities.

Contoh Nama Ubat Generik menggunakan Tallman Letters (FDA)	
aceta**ZOLAMIDE**	aceto**HEXAMIDE**
bu**PROP**ion	bus**PIR**one
chlorpro**MAZINE**	chlorpro**PAMIDE**
clomi**PHENE**	clomi**PRAMINE**
cyclo**SERINE**	cyclo**SPORINE**
DAUNOrubicin	**DOXO**rubicin
DOBUTamine	**DAP**amine
hydr**ALAZINE**	hydr**OXY**zine
TOLAZamide	**TOLBUT**amide
vin**BLAS**tine	vin**CRIS**tine

So, what were the intervention strategies? The first was to introduce the concept of innovative labelling and arranging of medications known as the 5 'S' Operational System. Apart from this, the "Tallman Lettering" method was used where different letters of the alphabet are capitalized to differentiate between similar looking or sounding medicines to prevent errors related to "Look Alike and Sound Alike" (LASA) medicines.

The second strategy was to generate greater awareness about dispensing errors by conducting "Best Practice Approach" (BPA) sessions amongst pharmacists and pharmacy assistants. Finally, the third strategy involved the Centralized Quality Dispensing Control (CQDC) system, where an additional pharmacist or pharmacy assistant is specifically assigned to countercheck the prepared medications before they were handed over to the dispensing counter.

The interventions led to a 14-57% reduction of potential dispensing errors in the study centres six months after the study began. Hospital A and Hospital B implemented the 5 'S' Operational System and the "Best Practice Approach" (BPA) awareness sessions while Hospital C implemented the 5 'S' Operational and the CQDC systems. Hospital A showed a reduction of 69 occurrences down from the initial 135 while Hospital B showed a reduction of 134 occurrences from 156 and Hospital C showed a reduction of 27 occurrences from 63.

Translating Research into Practice

The researchers found the 5 'S' method to be the most practical and implementable intervention. As a result, a standardized 5 'S' module was developed and implemented at other MOH Pharmacy facilities. In addition, training modules for the "Best Practice Approach" (BPA) are being discussed. Plans to expand the Centralized Quality Dispensing Control (CQDC) system into outpatient pharmacies are, in the works, but unfortunately are hampered by the lack of personnel or infrastructure in some facilities.

As the safety of patients is of utmost concern, plans to further minimize dispensing errors are in the pipeline. These include the implementation of the Pharmacy Information System (PhIS), the adoption of automated dispensing and the use of barcodes to help track and trace medications as they are collected from the shelves.

Research for health is not a luxury; on contrary, it is essential for **developing** future interventions and **improving delivery** of existing interventions.

The Lancet

PROTECTING THE POPULATION THROUGH

PUBLIC HEALTH INTERVENTIONS

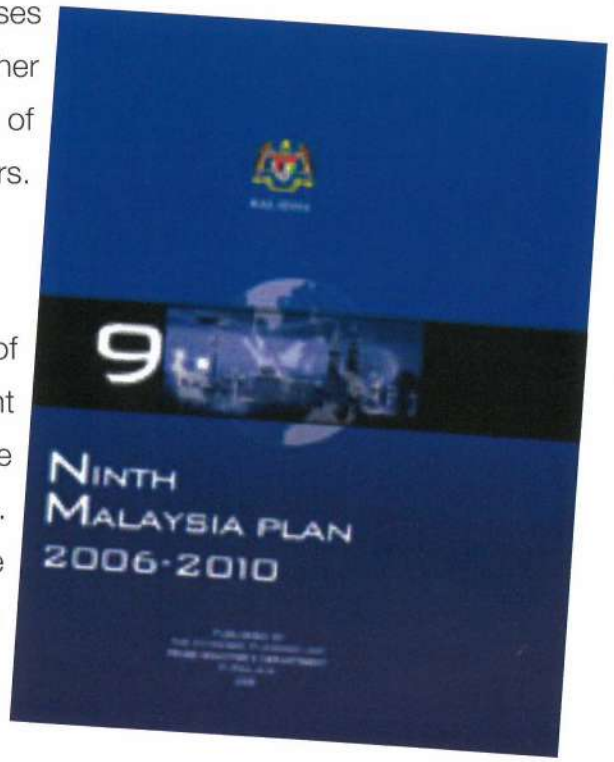
- Health Prioritisation: Burden of Disease Approach
- Malaysia: Towards a Smokefree Generation
- Tackling the Issue of Sexual Reproductive Health amongst Malaysian Youth
- Translating Obesity Research Findings into Practice: A Way Forward
- Achieving Global NCD Targets: Strengthening NCD Surveillance in Malaysia

Health Prioritisation: **Burden of Disease Approach**

Mohd. Azahadi Omar, Institute for Public Health, Ministry of Health, Malaysia

Have you ever wondered how governments prioritise health spending? Of the hundreds of thousands of diseases present in the world today, how do governments know which disease areas to prioritise over the others? For example, should more money be allocated to treat and prevent chronic diseases such as hypertension, or should more funds and efforts be geared towards treatment and prevention of infectious diseases such as tuberculosis? A difficult decision to make, policy makers in Malaysia are fortunately able to make informed decisions on health prioritisation guided by the burden of disease approach - thanks to the First Malaysian Burden of Disease and Injury Study published by researchers from the Institute for Public Health (IPH).

From the study, the researchers found the top two leading causes of burden of disease for males and females in Malaysia were ischaemic heart disease and cerebrovascular diseases. This was followed by road traffic accidents for males and septicaemia for females. Researchers also found Malaysian men to be facing illnesses such as chronic obstructive pulmonary disease, cirrhosis and other unintentional injuries, whereas women experienced more cases of depression, osteoarthritis, nutritional anaemia and anxiety disorders.



Helping to Build the 9th Malaysian Plan

The important findings from the study helped in the preparation of the Health Chapter of the 9th Malaysian Plan, where the top eight diseases identified as leading causes of Disability Adjusted Life Years (DALYs) by the study, were given special focus in the planning. The information contributed to improved efforts for health service deliveries, health research, resource allocations, cost evaluations as well as the improvement of curricula for professional training for prioritised diseases.

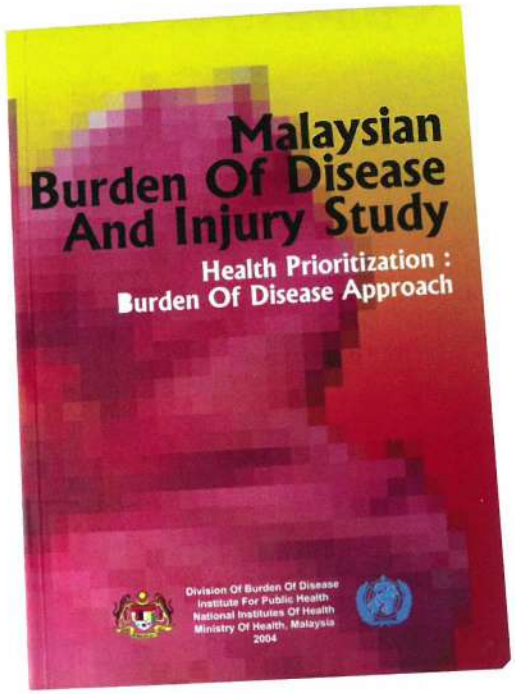
Burden of Disease and Injury Study

The researchers conducted the First Malaysian Burden of Disease and Injury Study as part of the ongoing efforts by the Ministry of Health Malaysia to produce timely information on the extent and distribution of health problems among Malaysians. Using a universal metric developed by the World Health Organization (WHO) and the World Bank for the Global Burden of Disease study in 1990 – the Disability Adjusted Life Years (DALYs) – this study provided the first detailed and internally consistent epidemiological estimates for a broad range of diseases, injuries and risk factors in Malaysia. More importantly, the findings generated were comparable between diseases, both nationally and internationally.

"There are various other health status indicators currently used in Malaysia such as Infant Mortality Rate (IMR), Maternal Mortality Rate (MMR), disease specific death rates, incidence and prevalence. The burden of disease estimates using DALYS is not to substitute other health status indicators; rather it is used as a complementary and comprehensive indicator to enhance policy formulation, as it takes into account both disability and death attributed by diseases."

Working Together to Provide a Clearer Picture

The study highlighted successful collaborations with international and national researchers. Researchers from the IPH worked together with WHO consultants from the Centre for Burden of Disease and Cost-effectiveness Analysis, School of Population Health, University of Queensland, Australia, who provided technical assistance and expertise. Pivotal data for the study were obtained from local authorities and data contributors; namely Communicable Disease Notification System, National Health and Morbidity Survey, National Cancer Registry, local hospitals and the Department of Statistics, Malaysia.



A Second Malaysian Burden of Disease and Injury Study report was published in 2012 and efforts are currently ongoing to update the study to reflect epidemiological changes in the country. The MOH is committed to evidence-based decision making and plans to continue the burden of disease study as a robust and valid tool for health prioritisation.

Health Prioritisation: Burden of Disease Approach

Responding to healthcare needs and setting priority for health remain challenges for governments as population are demanding for better health services and greater accountability for the funds allocated and whether intended objectives and health goals have been achieved. Rational decisions on resources allocation based on health outcomes essentially required adequate tools. One of the globally accepted tools is a comprehensive method of measuring loss of healthy life in population using the Disability-Adjusted Life Year method.

What are DALYs?

The Disability-Adjusted Life Year (DALY) is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death. It extends the concept of potential years of life lost due to premature (early) death, to include equivalent years of "healthy" life lost by virtue of being in states of poor health or disability (ie : mortality and morbidity are combined into a single, common metric. One year of DALY equivalent of One year loss of health life.

Correlation of the Study and Malaysia

In Malaysia, The first Burden of Disease Study was conducted by Institute for Public Health. It is part of the ongoing efforts of the Ministry of Health Malaysia to produce timely information on the extent and distribution of health problems among the Malaysian population attributable to diseases, injuries, and various risk factors. This study provided the first detailed and internally consistent epidemiological estimates for a broad range of diseases, injuries and risk factors in Malaysia. It applies methods developed by the World Health Organization (WHO) and the World Bank for the Global Burden of Disease study in 1990.

Collaboration between Local and International

The study was conducted in collaboration with WHO consultants from the Centre for Burden of Disease and Cost-effectiveness Analysis, School of Population Health, University of Queensland, Australia. Moreover, other local authorities and data contributor such as Communicable Disease Notification System, National Health and Morbidity Survey, National Eye Survey, National Cancer Registry, National Renal Registry as well as Hospitals data. The mortality data was provided by the Department of Statistics, Malaysia. Various meeting with disease expert groups had also been conducted. The method of the study was presented, discussed and the feedbacks were incorporated in the study.

Output of the Study

The leading cause of burden of disease for both males and females is Heart Disease. In men, Road Traffic Accident is the next leading cause followed by stroke. These 3 diseases accounted for almost one fourth of total burden of disease in male. Among women, stroke and depression are other leading causes of burden of disease. These 3 diseases contributed to one fifth of the total burden of disease in female.

Implication

The findings of this study had been used in the preparation of Health Chapter of the 9th Malaysian Plan (ie : The top 8 diseases had been used as one of the criteria in planning for 9th MP). The planning contributed to development of the new policies and health systems that affect the health status of the Malaysia's population.

Future Direction

The Ministry of Health Malaysia still proceed with the health prioritization in ensuring the status of disease is under controlled. Thus, the study will continue every year to observe the health status among Malaysia and counter any disease outbreak. With the motto of "Kami Sedia Membantu", we would predict that Malaysia will be become the most leading health prioritization throughout the world.

Malaysia: **Towards Smokefree Generation**

Tee Guat Hiong[1], Noraryana Hassan[2], Nizam Baharom[2], Izzuna Mudla Mohamed Ghazali[3]
[1]Institute for Public Health, [2]Disease Control Division, [3]Medical Development Division, Ministry of Health, Malaysia

Have you noticed how the smell of cigarette smoke does not permeate the air anymore in restaurants and shopping malls? How you can take deep breaths in stadiums and sports complexes without fearing about breathing in second-hand smoke? Or how relieved you feel knowing that your children are not exposed to cigarette smoke in their nurseries and school buses? This is thanks to the Ministry of Health (MOH) in implementing a Long Term Strategic Plan for Tobacco Control; which aims to reduce smoking prevalence to 15% by 2025 and to reach The Endgame by 2045 (smoking prevalence <5%).

The Tobacco Endgame Concept

It all started with the worldwide Tobacco Endgame concept - a strategic plan to eliminate the tobacco epidemic by reducing the number of adult smokers to less than 5% of the adult population; ending the commercial sale of tobacco products; denormalising smoking culture in society and ensuring no child is exposed to tobacco.

Smoking is Still a Big Problem in Malaysia

The above plan is a rather lofty goal. After all, smoking is still a big problem in Malaysia. The second National Health and Morbidity Survey (NHMS II) estimated an overall adult smoking prevalence of 24.8% in Malaysia in 1996; 10 years later, the third NHMS estimated a prevalence of 22.8%. The Global Adult Tobacco Survey (GATS) in 2011 among adults 15 years and above found the prevalence to be 23.1%. All in all, the number of adult smokers in Malaysia seemed to be on a plateau. This is not good news. Much scientific evidence point towards tobacco smoking as a major cause of many illnesses for smokers and also those exposed to cigarette smoke. In Malaysia, diseases related to smoking remain the top cause for morbidity and mortality in government hospitals.

The mean age of smoking initiation among Malaysians was 17.2 years and about 1 in 10 Malaysian started smoking at <15 years old.

- GATS 2011

GATS 2011

Steps towards a Smokefree Generation

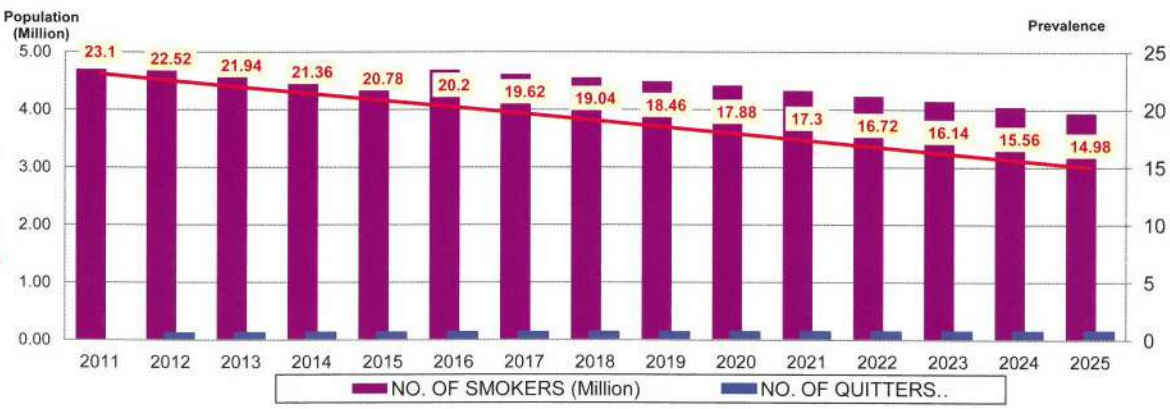
To achieve the goals set out by the Tobacco Endgame, the Ministry of Health Malaysia – armed with research findings from the GATS study, NHMS studies and the Burden of Disease study conducted by IPH – set up the Long Term Strategic Plan for Tobacco Control and developed the Tobacco Control Roadmap 2014-2025. The plan aims to reduce smoking prevalence to 15% by 2025 and to reach the Endgame by 2045. To achieve these aims, the working committee including researchers at IPH came up with some specific objectives. The first is to have all children born in year 2009 and after not to start smoking. Proper planning to follow this cohort of children has been prioritized. The second objective is to denormalise Malaysians towards smoking behaviour. This is the most important tool to encourage current smokers to quit smoking; hence reducing smoking prevalence. The third objective is to expand public non-smoking areas. It is hoped that having more gazetted non-smoking areas will inspire smokers to quit.

MALAYSIA'S TOBACCO CONTROL ROAD MAP FOR 2014 - 2025

Target : To reduce smoking prevalence to 15% by 2025

	YEAR	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Million	* TOTAL POPULATION (Age ≥ 15)	20.8	21.6	22.0	22.4	22.8	23.2	23.5	23.9	24.3	24.7	25.0	25.3	25.7	26.0	26.3
Million	NO. OF SMOKERS	4.70	4.86	4.83	4.78	4.74	4.69	4.61	4.55	4.49	4.42	4.33	4.23	4.15	4.05	3.94
Million	NO. OF QUITTERS		0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15
PREVALENCE (%)		23.1	22.5	21.9	21.4	20.8	20.2	19.6	19.0	18.5	17.9	17.3	16.7	16.1	15.6	15.0

130,000 smokers must quit smoking every year



INCREASE QUITTERS FROM 4.7 MILLION ADULT SMOKERS

HALT INITIATION OF NEW SMOKERS ESPECIALLY AMONG CHILDREN

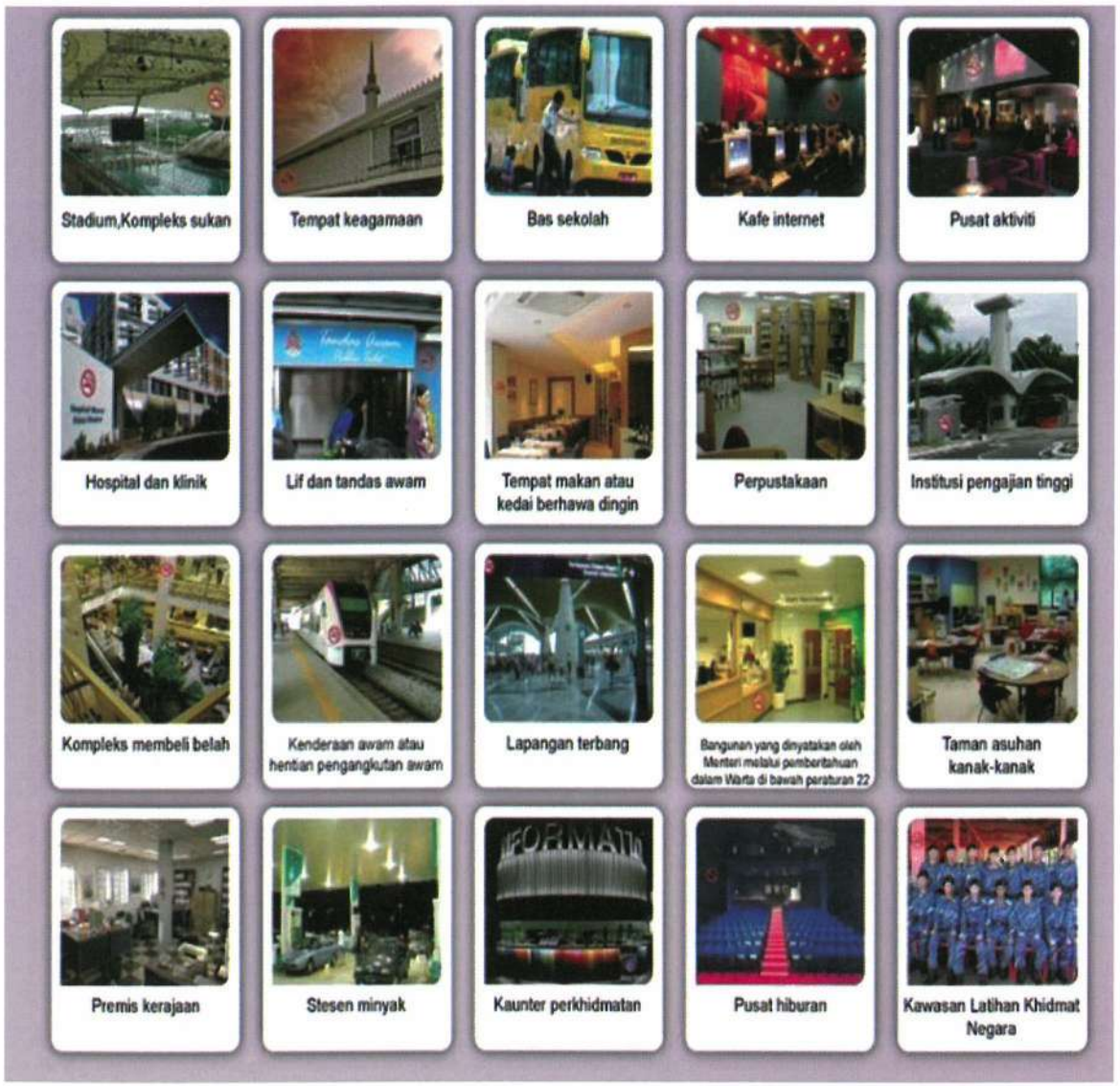
SMOKEFREE MALAYSIA

Kami Sedia Membantu KEMENTERIAN KESIHATAN MALAYSIA

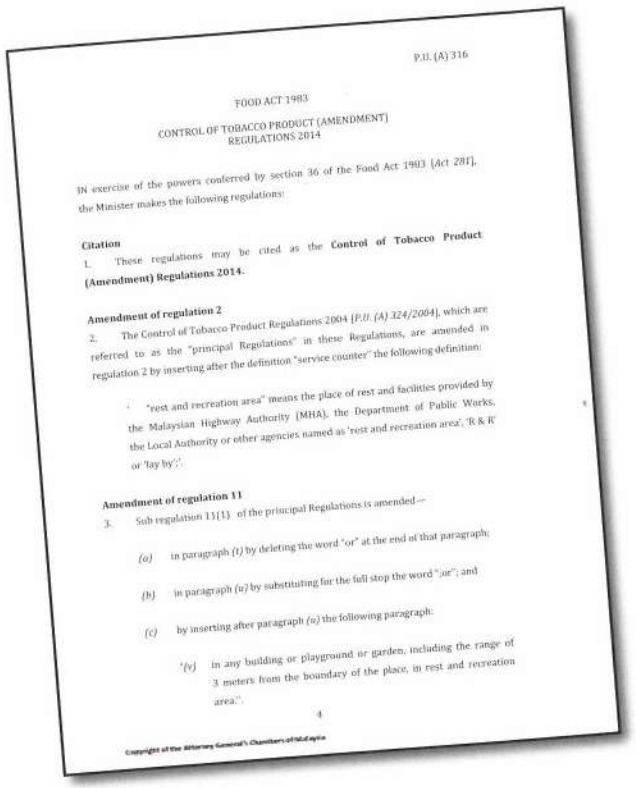
Bahagian Kawalan Penyakit
Kementerian Kesihatan Malaysia

Major Breakthroughs

As a result of the careful planning, collaboration and coordination with multiple sectors of the Government, some concrete steps have been achieved to help pave the pathway to a smokefree generation in 2045. For example, a total of 20 public places have been gazetted to be smokefree before 2014. These public places are listed below:



Another major and significant breakthrough occurred in 2014. All Rest and Relax (R & R) areas located on the highways have been gazetted to be smokefree by amending the Food Act 1983 - Control of Tobacco Product (Amendment) Regulations 2014. This represents a big step towards denormalising the smoking habit at eateries.



P.U. (A) 316

FOOD ACT 1983

CONTROL OF TOBACCO PRODUCT (AMENDMENT) REGULATIONS 2014

IN exercise of the powers conferred by section 36 of the Food Act 1983 [*Act 281*], the Minister makes the following regulations:

Citation

1. These regulations may be cited as the **Control of Tobacco Product (Amendment) Regulations 2014**.

Amendment of regulation 2

2. The Control of Tobacco Product Regulations 2004 [*P.U. (A) 324/2004*], which are referred to as the "principal Regulations" in these Regulations, are amended in regulation 2 by inserting after the definition "service counter" the following definition:

"'rest and recreation area' means the place of rest and facilities provided by the Malaysian Highway Authority (MHA), the Department of Public Works, the Local Authority or other agencies named as 'rest and recreation area', 'R & R' or 'lay by';".

Amendment of regulation 11

3. Sub regulation 11(1) of the principal Regulations is amended—

(*a*) in paragraph (*t*) by deleting the word "or" at the end of that paragraph;

(*b*) in paragraph (*u*) by substituting for the full stop the word ";or"; and

(*c*) by inserting after paragraph (*u*) the following paragraph:

"(*v*) in any building or playground or garden, including the range of 3 meters from the boundary of the place, in rest and recreation area;".

4

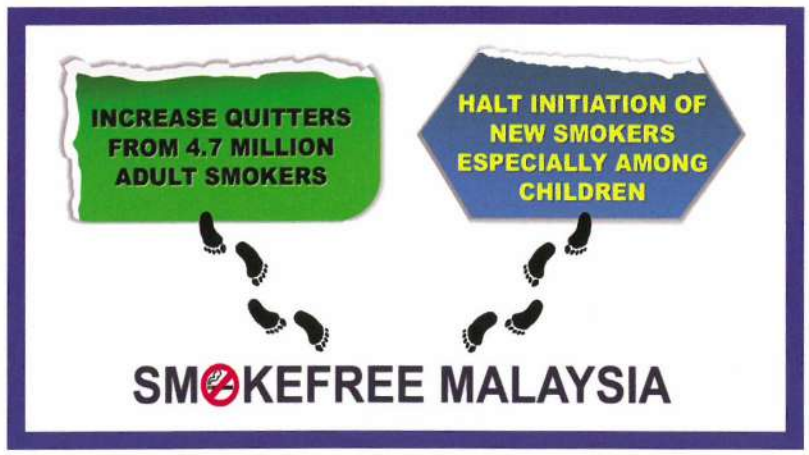
BEFORE

AFTER

Another Achievement, Smokefree Cities

The Way Forward

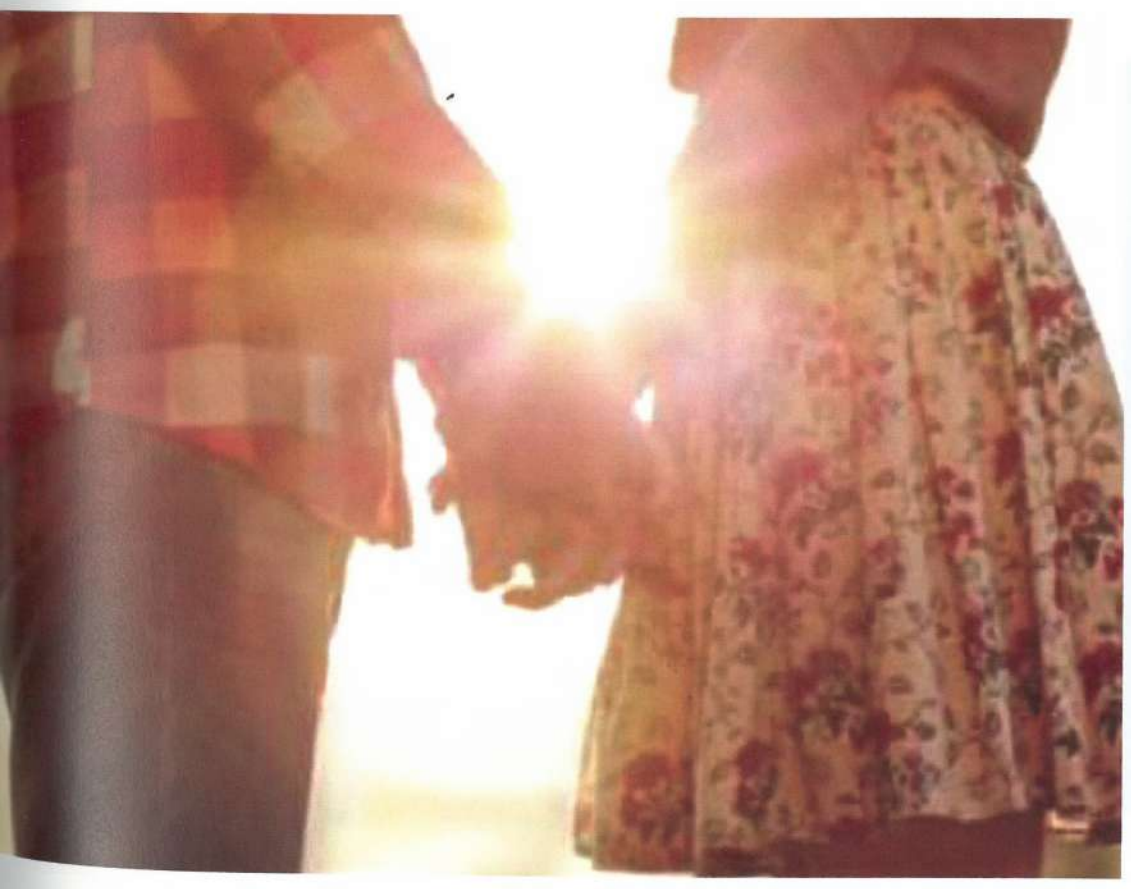
The way forward is not easy and much remains to be done. The Government has planned to enhance antismoking campaigns towards the Smokefree Generation by targeting various segments starting from preschool, primary school, secondary school, adolescents and adults. In addition, accessibility of quit smoking services have to be improved to help current smokers quit the habit. The MOH also plans to expand quit smoking services and develop a centralised quit smoking database. The services will be provided not only by the government health facilities but also the private health facilities including general practitioners and retail pharmacies. The MOH is hopeful that with the current strategies to encourage smokers to quit smoking and prevent new smokers from picking up the habit, the endgame of tobacco will be achieved.



Tackling the Issue of Sexual Reproductive Health **amongst Malaysian Youth**

Noor Ani Ahmad[1], Nik Rubiah Nik Abdul Rashid[2], Noridah Mohd Salleh[2], S. Maria Awaludin[1]
[1]Institute for Public Health, [2]Family Health Development Division, Ministry of Health, Malaysia

The issue of sexual reproductive health, especially amongst youth and adolescents, has always been a sensitive subject for the Malaysian society at large. Asking unmarried youth questions about sex is perceived as teaching them about sex; schools are not receptive to studies on sexual behaviours in their setting. Researchers from the Institute for Public Health (IPH) were however able to obtain data on sexual reproductive health from a nation-wide screening of youth in Malaysia in 2010. The researchers analysed a representative sample of the data and found an alarming trend in that pre-marital sex amongst youth had increased to 6.5% in 2010 when compared to 2.2% in 2004 and 1.8% in 1996. In addition, the 2010 data also revealed that 0.5% of the adolescents who reported having pre-marital sex had abortions before.



"The researchers analysed a representative sample of the data and found an alarming trend in that pre-marital sex amongst youth had increased to 6.5% in 2010 when compared to 2.2% in 2004 and 1.8% in 1996."

However, tackling the complex issue of sexual reproductive health amongst youth involves not only health but issues such as education, religion and parenting, and thus it warrants involvement from higher level authorities.

A Challenging Problem

The alarming results were an eye-opener for many. To counter the negative results, members of the National Adolescent Technical Group which comprised of various governmental ministries, public agencies, universities and non-governmental agencies chaired by the Deputy Director General of Health, unanimously agreed that more attention should be focused on the issue. However, tackling the complex issue of sexual reproductive health amongst youth involves not only health but issues such as education, religion and parenting, and thus it warrants involvement from higher level authorities. In addition, inter-agency coordination is required. This was difficult to achieve as there was no prior council that had been set up to address this issue.

The impetus for a real conversation around the issue of sexual reproductive health amongst youth came about when a 2012 school-based nationwide survey conducted by the IPH revealed that 8.3% of secondary school students admitted to having sex. The findings were once again presented to the National Adolescent Technical Group, and this time around, the sharp increase in the figures brought everyone's attention to the seriousness of the problem.

Working Together to Find Solutions

The findings brought special attention of top leaders to the worrisome problem of teenage pregnancies in Malaysia. In early 2014, the Social Committee Working Committee (SCWC) at the Prime Minister's Department and the Majlis Sosial Negara (National Social Council) were engaged to look into this issue. As a result, in April 2014, a workshop was held to find solutions to the problem. The paper *"Masalah Remaja di Malaysia"* (Teenage Problems in Malaysia) was presented to the *Mesyuarat Menteri Besar dan Ketua Menteri* (Meeting of Menteri Besar and Chief Ministers) on 28 October 2014. Further conversations were held when the Director of the National Family Planning and Development Board again raised the issue during *Mesyuarat Jawatankuasa Pelaksanaan Pelan Tindakan Kesihatan Reproduktif dan Sosial (PEKERTI)* (Meeting of the Committee on Implementation of the Action Plan on Reproductive and Social Health) in November 2014. This problem is being planned to be presented to the *Majlis Raja-Raja* (Conference of Rulers) to gain support from royalty to tackle this issue, particularly towards unmarried Muslim teenagers.

Remaja hamil awal jejas masa depan negara – Raja Zarith

30 Oktober 2015 12:41 AM

Like 364 Share 24 Tweet 10 Google + 0

Raja Zarith Sofiah Sultan Idris Shah memegang buku garis panduan 'Pusat Jagaan Ku Sayang' dalam Program Generasiku Sayang di Dewan Kementerian Kesihatan, Putrajaya, semalam. Turut hadir, S. Subramaniam (tengah). BERNAMA

PUTRAJAYA 29 Okt. – Kajian Kementerian Kesihatan mendapati secara purata setiap tahun sebanyak 18,000 remaja perempuan hamil pada usia antara 10 dan 19 tahun dengan 4,500 orang dilaporkan tidak berkahwin.

Research Data Leading Forward to Concrete Steps

The research findings from IPH had led to the successful engagement of various stakeholders at the national level and have created the much-needed awareness as well as open discussions on the issue of sexual reproductive health among the youth.

Various steps to tackle the issue have been taken at multiple levels. Rehabilitation centres for unmarried teenage mothers who do not have social support have been established. Stakeholders working on this issue have also gained a powerful and influential partner when the *Generasiku Sayang* programme, which focuses on the issue of pregnant, unmarried teenage mothers, received patronage and support from the Johor Royal Family.

On the health front, the evidence generated by IPH has also helped programme managers of adolescent health programmes to advocate holistic intervention for teenage pregnancies. The Ministry of Health has also worked tirelessly to strengthen the competency of staff at health clinics in delivering sexual reproductive health services to adolescents. At schools, clinics and communities, advocacy programmes and sexuality education programmes have been established and are being strengthened.

Translating Obesity Research Findings into Practice: **A Way Forward**

Rashidah Ambak, Noor Safiza Mohamad Nor, Institute for Public Health, Ministry of Health, Malaysia

Obesity is a global public health threat and Malaysia is not spared either. The National Health and Morbidity Survey 2011 reported that the prevalence of obesity in Malaysia is on the increase. In less than 20 years, the proportion of overweight adults in Malaysia has doubled while the obese proportion has tripled. Through various means, the Ministry of Health Malaysia (MOH) continues to support intervention programmes to reduce the prevalence of overweight and obesity in the community, school and workplace.

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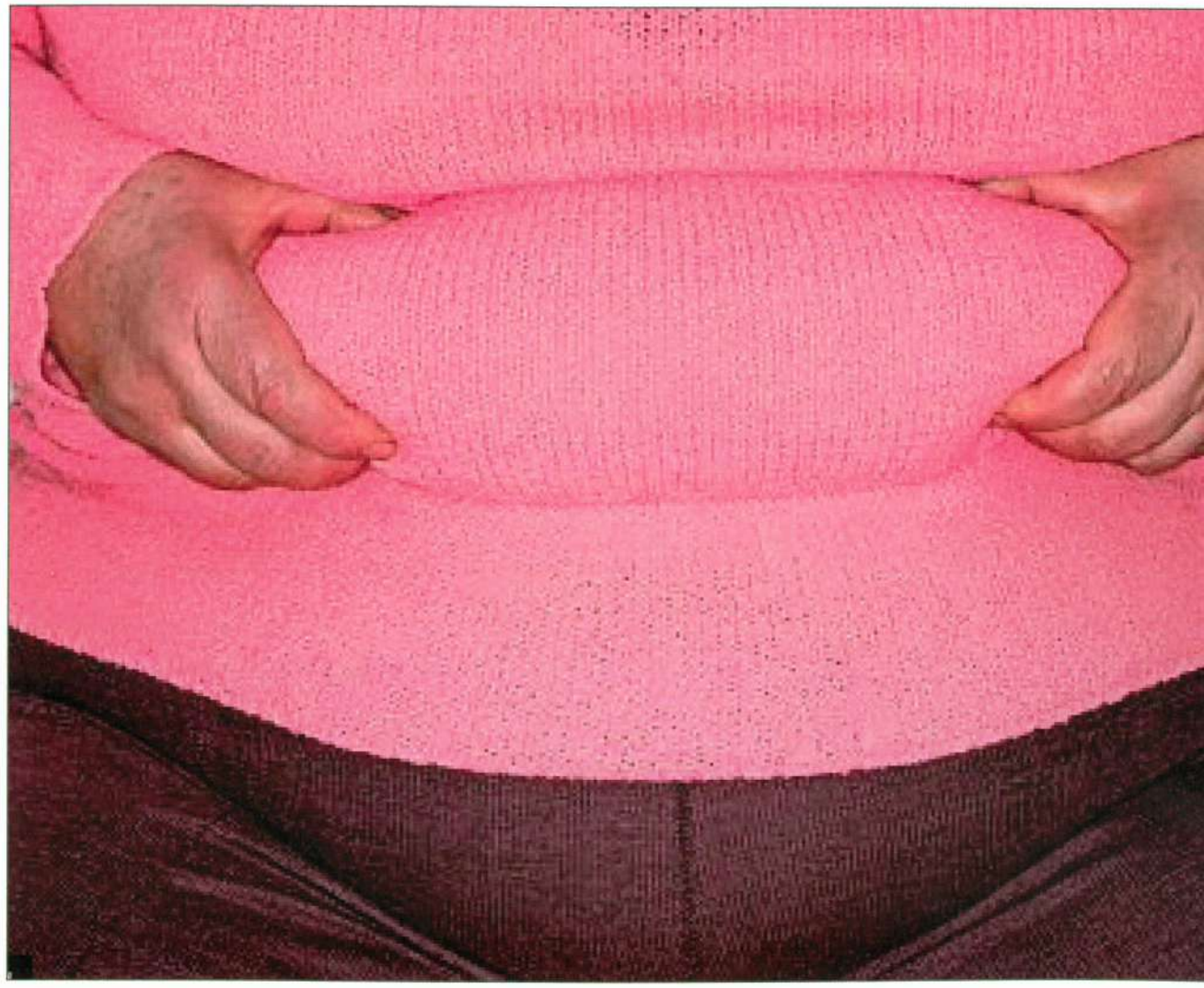


Customized Programme to Combat Obesity

One such programme is the 'My Body is Fit and Fabulous at Home' (MyBFF@home). In 2013, the Institute for Public Health (IPH) carried out the MyBFF@home programme in low-cost community flats around Kuala Lumpur and the surrounding Klang Valley. The programme aimed to develop a weight loss intervention package and to evaluate the effectiveness of the intervention among overweight and obese housewives who are 18 to 59 years old. MyBFF@home was adapted from a 'My Body is Fit and Fabulous' (MyBFF) programme which was developed in 2012 through collaborations with the Malaysian Industry-Government Group for High Technology (MIGHT) and the Sackler Institute for Nutrition Science, New York to combat obesity among school children, working adults and housewives in Malaysia.

The MyBFF@home was conducted in two phases from 2013–2014; it employed both quantitative and qualitative methods. The first phase was to develop the intervention package. The researchers did this by first carrying out a preliminary review; this was followed by the development of the interventions. They further fine-tuned the intervention package after a series of in-depth interviews with housewives.

The second phase began in early January 2014 when staff from the surrounding 1Malaysia Clinics and community representatives recruited housewives from 16 low-cost flats around the Klang Valley. The housewives were divided into a control and an intervention groups to evaluate the effects of the intervention.

A physiotherapist conducting dumbbell exercise with housewives at low cost flats in Kuala Lumpur.

Housewives in the intervention group underwent six months of weight loss programme followed by six months of weight maintenance. Weight loss was achieved through exercises and calorie intake restrictions. The housewives underwent individual counselling on diet, physical activity and a series of self-monitoring activities at home. In addition, group exercises using pillow dumb bells were held. The control group attended a series of six seminars on women's health.

By monitoring the blood pressure, body weight, body fat percentage, dietary intake and assessing the quality of life in both study groups over a period of time (0, 6 and 12 months), the study found that MyBFF@home was effective in reducing weight, waist circumference and blood pressure among the housewives in that group. The intervention also helped to improve cardio-metabolic risk factors among the housewives. An improvement in body composition parameters such as fat mass, visceral fat and body fat percentage was also observed among some participants in the intervention group.

Clearing the Obesity Research Silo Hurdle

In the past 10 years, much research has been conducted to support evidence related to obesity in Malaysia. However, one of the major challenges is that not many obesity research findings have been translated into policy and practice.

What is different about MyBFF@home is that the findings from the study have been utilised to support health programmes and clinical practice of health professionals within the MOH. Dietary components and brisk walking have been adapted into the *Komuniti Sihat Perkasa Negara (KOSPEN)* programme as a community-based weight loss intervention programme. The counselling protocol has also been used as clinical guidance to standardise the weight management counselling for dieticians and nutritionists at hospitals and community clinics. In this way, the findings of the MyBFF@home are translated into practice and continue to support health professionals in Malaysia.

Achieving Global NCD Targets: **Strengthening NCD Surveillance in Malaysia**

Muhammad Fadhli Mohd Yusoff[1], Feisul Idzwan Mustafa[2]
[1]Institute for Public Health, [2]Disease Control Division, Ministry of Health, Malaysia

Non-Communicable Diseases (NCDs), also known as chronic diseases, is the leading cause of death in the world including Malaysia. The four main NCDs - cardiovascular disease, cancer, chronic lung diseases and diabetes - kill three in five people worldwide.

Although it seems that the world is fighting a losing battle against NCDs, however, all is not lost.

Leaders against NCDs

In 2011, political leaders worldwide declared the fight against NCDs at the United Nations General Assembly. Following that, the World Health Organization (WHO) developed a global monitoring framework to enable global tracking of progress in preventing and controlling major NCDs as well as their key risk factors. Malaysia has also developed our own national targets and indicators based on this global monitoring framework. The overarching target is to reach a 25% reduction in premature deaths from NCDs by 2025 from the baseline in 2010. This means reducing the risk of deaths from NCDs from the estimated 20% to 15% for Malaysians aged between 30 to 70 years. The national targets and indicators are depicted in Table 1.

Table 1: NCD Targets for Malaysia

Global Indicator	Global Target	Baseline for Malaysia (2010)	Target for Malaysia (2025)
Premature mortality	25.0% reduction	20.0%	15.0%
Tobacco use	30.0% reduction	23.0%	15.0%
Harmful use of alcohol	10.0% reduction	HED* 1.2%	HED* <1.2%
Physical inactivity	10.0% reduction	35.2%	30.0%
Salt/sodium intake	30.0% reduction	8.7gm/day	6.0gm/day
Raised blood pressure	25.0% reduction	32.2%	24.0%
Diabetes/obesity	0% increase	15.0%	<15.0%

**HED: Heavy Episodic Drinking.*

NCD Surveillance Key to Success

To achieve and monitor targets set out in the framework, it is crucial for Malaysia to have a good surveillance system in place. The Institute for Public Health (IPH) plays an important role in the country-level health surveillance and monitoring; and has made this one of its most important priorities.

The IPH employs an important and practical strategy to strengthen Malaysia's NCD surveillance system – that of leveraging existing surveillance systems as much as possible. Over the years, IPH has undertaken many population-based surveys, which were mostly done on an ad hoc manner and in collaboration with the Public Health Programme. Current surveillance activities related to NCDs are listed in Figure 1 below.

IPH takes its responsibilities seriously in setting up, conducting and coordinating NCD surveillances. It hopes to continue providing important data to MOH policy-makers for evidence-based decision making.

National Health and Morbidity Survey (NHMS)

- The National Health and Morbidity Survey (NHMS) is a nationally representative household survey of Malaysian population. The aim is to provide health related community-based data to support the MOH in reviewing health priorities, programme strategies and activities, and planning for allocation of resources. Initiated in 1986, it was initially conducted every ten years. NCDs and NCD risk factors have been studied since the first NHMS, which reflects the importance of the NCD surveillance in the country.
- Starting from 2011, NHMS became a 4 yearly survey with annual data collection. NCD and NCD risk factors, health service utilization and health expenditure would be conducted in the first year of each cycle. Modules on NCD would include diabetes mellitus, hypertension, hypercholesterolemia, nutritional status, dietary behaviour, physical activity, smoking and alcohol.

Global School-Based Student Health Survey (GSHS)

- A collaborative surveillance project designed by the World Health Organization (WHO) to measure the behavioural risk factors and protective factors in 10 key areas among adolescents aged 13-17 years, this survey uses standardized methodology to allow for comparisons across countries. The questionnaire addresses the leading causes of morbidity and mortality among children and adult worldwide, including NCD and NCD risk factors. The survey was first conducted in 2012 and will be conducted on regular basis in four yearly cycles, in collaboration with the Ministry of Education Malaysia.

Malaysian Adult Nutrition Survey (MANS)

The Malaysian Adult Nutrition Survey (MANS) is a nutrition survey conducted nationwide to determine the nutritional status, dietary pattern and physical activity pattern among Malaysian adults aged 18-59 years old. The survey studies the anthropometric measurements, nutrient intake, habitual food intake, physical activity and pattern of supplement intake of Malaysians. MANS was first initiated in 2003 and most recently repeated in 2014.

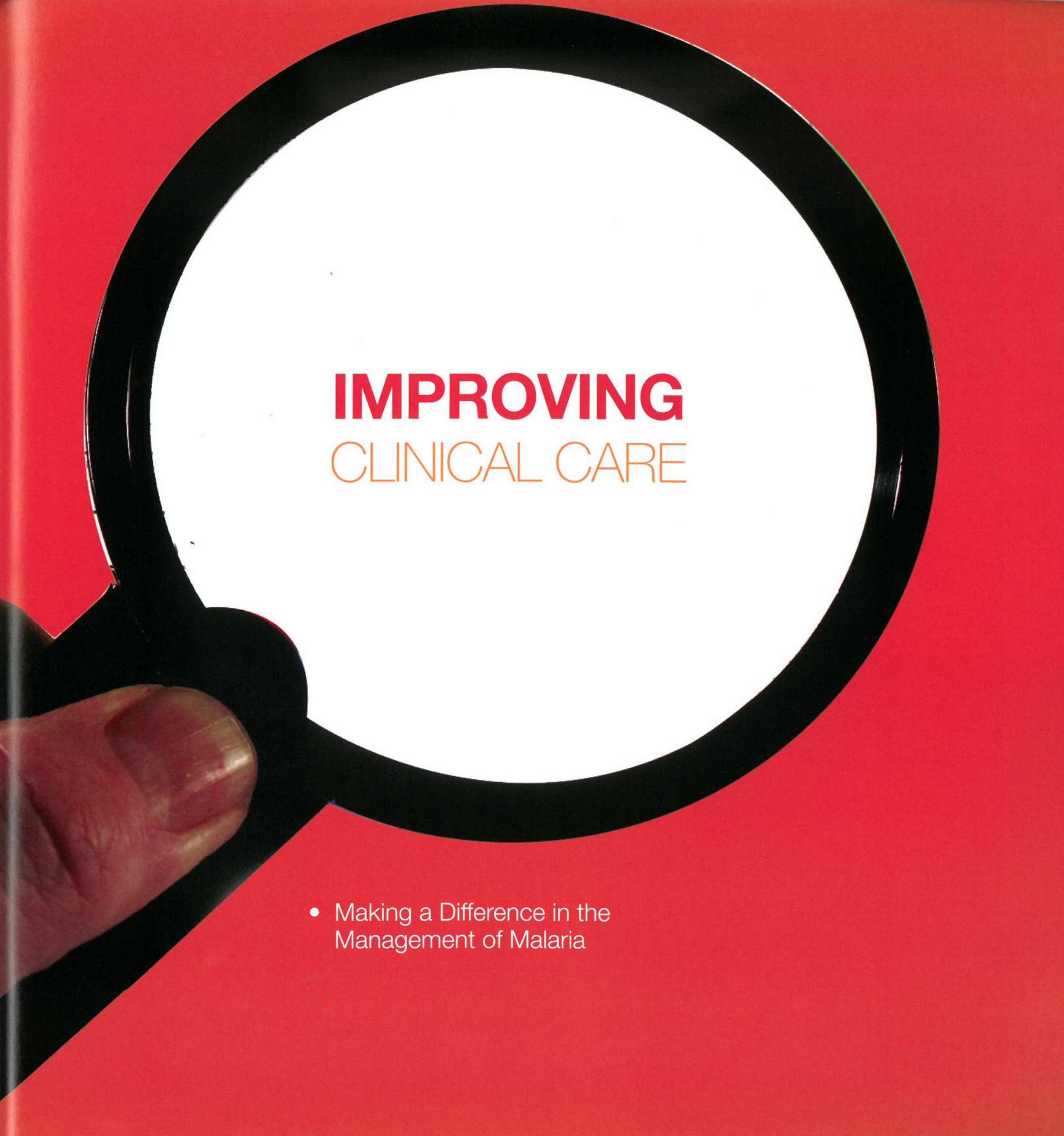
Burden of Disease Study (BOD)

- Burden of Disease Study is a study that assesses the burden of mortality and morbidity in Malaysia. It will be a regular study to look into the trend of the burden of disease in the country. One of the major components in the study is the calculation of premature mortality due to diseases in Malaysia, used to monitor one of the Global NCD target (ie: 25% reduction of premature mortality due to NCD by 2025).

Special Survey for Salt Intake: 24-hour Urine Collection

- High sodium intake over an extended period of time has been associated with hypertension and other related non-communicable diseases (NCD) such as stroke, renal damage and heart failure. Reducing sodium intake is one of the most cost-effective approaches for NCD prevention. In 2012, a study found urinary sodium excretion among normotensive health staff in Ministry of Health Malaysia is 71% higher than WHO recommendation. A similar study is planned to be repeated in 2015. Findings from the studies would help the MOH in planning and implementing their intervention strategies.

Figure 1: Current NCD Surveillance Activities.



IMPROVING
CLINICAL CARE

- Making a Difference in the Management of Malaria

Making a Difference in the **Management of Malaria**

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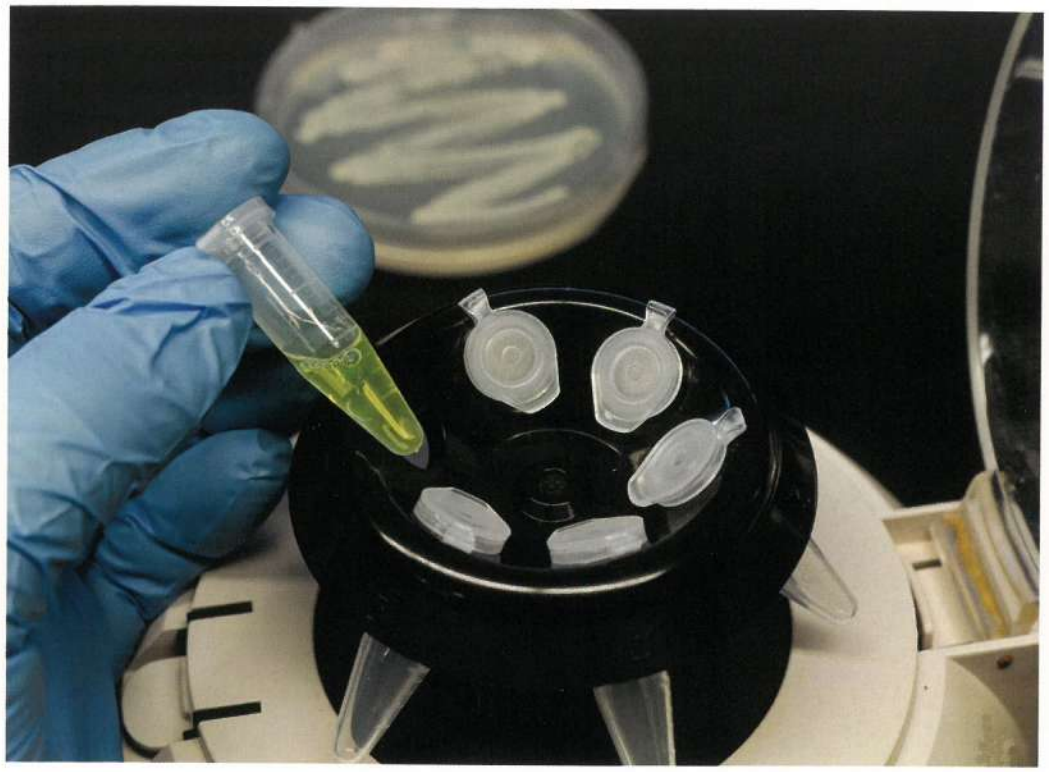
The Ministry of Health Malaysia (MOH) has had great success in controlling malaria over the past 20 years. However in Sabah and Sarawak, the current battle is against monkey malaria, also known as *Plasmodium knowlesi* malaria. Efforts initiated by the MOH, University Malaysia Sarawak (UNIMAS) and its partners have improved the understanding of the epidemiology, diagnosis and clinical features of emerging *Plasmodium knowlesi* malaria. Its importance is now recognised.

Monkey malaria is a more complicated form of malaria. It rapidly replicates and infections could be fatal. The main reservoirs of this malaria parasite are monkeys, specifically long tailed and pig tailed macaques. In Sarawak, most of the long tailed macaques are infected with one Plasmodium species or another, and about 80% are infected with *P. knowlesi*.

However, due to changes in land use, more and more humans are encroaching on the habitat of the long-tailed macaques and hence, face a higher risk of being bitten by mosquitoes carrying the parasites.



Crossing Over into the Human Population

Transmission of the *P. knowlesi* parasite from infected monkeys to humans is possible via a type of Anopheles mosquitoes. This only occurs in areas where both macaques and humans are present. However, due to changes in land use, more and more humans are encroaching on the habitat of the long-tailed macaques and hence, face a higher risk of being bitten by mosquitoes carrying the parasites.

Recognising the Hidden Problem

This form of malaria was first discovered to infect humans in large numbers in Kapit, Sarawak by Professor Balbir Singh and his team of researchers from University Malaysia Sarawak. This was one of the most significant discoveries in the field of medicine in Malaysia, as prior to this, infections from *P. knowlesi* were often misdiagnosed as *P. malariae*, another form of malaria.

The Malaysian Ministry of Health's Clinical Research Centre (CRC) team - led by Dr. Timothy William with their university counterparts from UNIMAS, University Malaysia Sabah and University Malaya as well as other highly acclaimed international research institutions like the Menzies School of Health Research, Australia and the London School of Hygiene and Tropical Medicine - have conducted many studies on monkey malaria in Malaysia especially in Sabah and Sarawak over the past decade.

Fast forwarding into the present, their research currently uses GPS devices to look into human and macaque movements. The researchers also employ drones or unmanned aerial vehicles for land use. The researchers also look into the densities and biting behaviours of mosquitoes to investigate the geographical patterns of the disease.

Their findings have revealed that the *P. knowlesi* malaria is the most common human malaria in the Malaysian Borneo and that the incidence of *P. knowlesi* malaria is increasing, infecting not just adults but also children. Infections with *P. knowlesi* are associated with a three-fold greater risk of severity in adults compared to the previously-more-common plasmodium species, *P. falciparum*. In addition, *P. knowlesi* parasitaemia is associated with age and is the major independent risk factor for severity.

Delivering Evidence-Based Treatment to Our People

The research team has also conducted molecular and clinical research works that have shed more light on *P. knowlesi* at the microbial and diagnostic levels.

In addition, they have also carried out the first prospective study to evaluate the efficacy of drug therapy for the treatment of *P. knowlesi* malaria. Treatment with artemisinin, a type of malaria drug, was found to be highly effective for severe malaria from all species and associated with zero deaths. The researchers have also shown a high failure rate for the treatment of *P. vivax* when chloroquine is used compared to artemesinin combination therapy.

The results of the studies on *P. knowlesi* and *P. vivax* have been incorporated into the WHO guidelines for the treatment of malaria and also our own Malaysian guidelines for malaria.

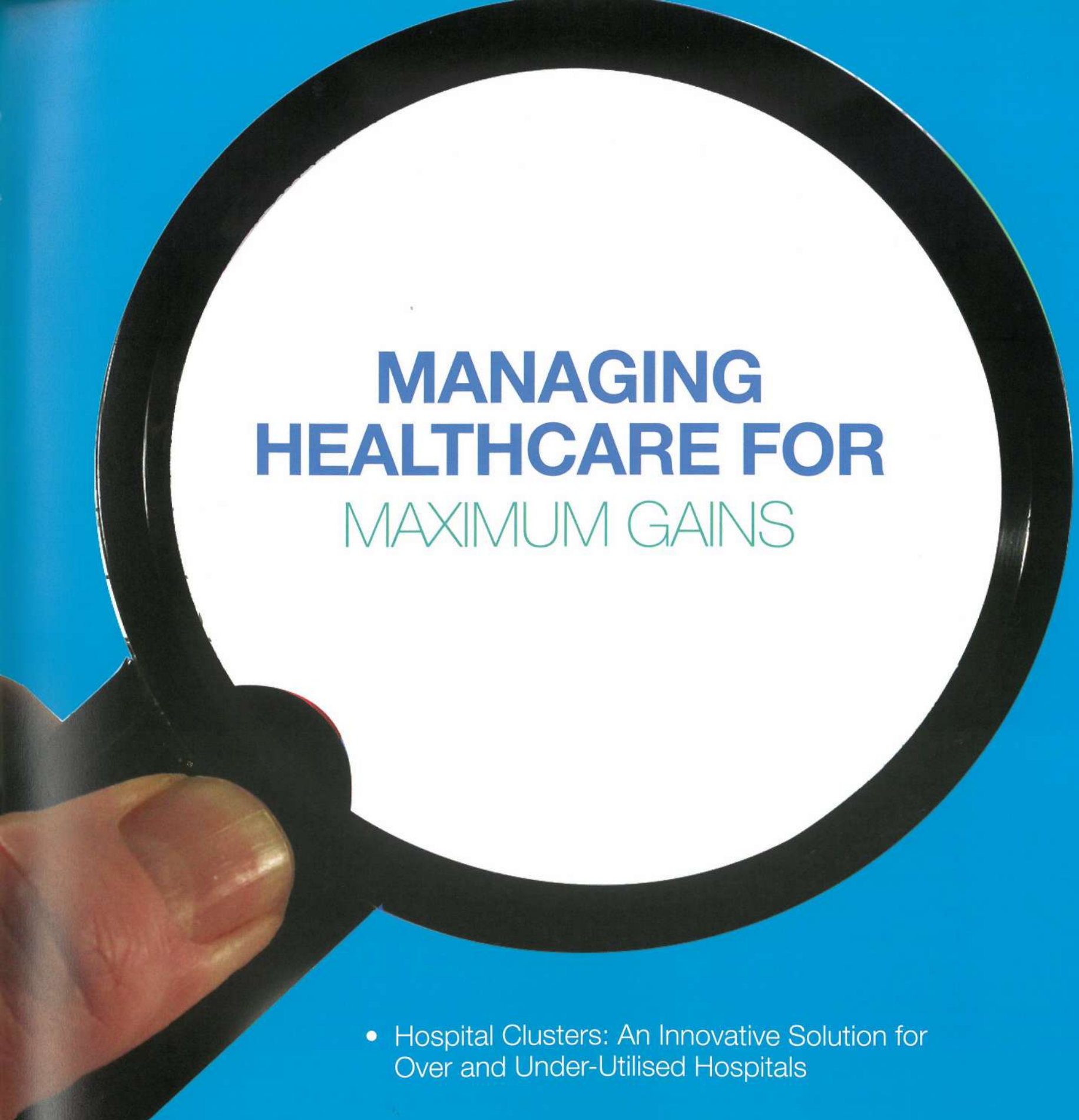
Putting Malaysia in Prominence

The findings, by local researchers from MOH, CRC, University Malaysia Sarawak, including their collaborating partners from many countries, have provided valuable insight into the epidemiology, diagnosis and clinical features of *P. knowlesi* malaria with important implications for malaria elimination in the region. The results have been published in journals and presented at multiple national and international meetings, and have placed Malaysia in prominence with other researchers from around the world.

Local researchers from MOH, CRC, University Malaysia Sarawak, including their collaborating partners from other countries.

Research can only present data about the past. **No one seriously believes** that people's answers to hypothetical questions about the future accurately **represent their future behaviour**; they merely represent a current attitude, which **may not be translated into future behaviour**.

Stephen King



MANAGING HEALTHCARE FOR MAXIMUM GAINS

- Hospital Clusters: An Innovative Solution for Over and Under-Utilised Hospitals

Hospital Clusters: **An Innovative Solution for Over and Under-Utilised Hospitals**

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Need For Space

The monitoring machines continue their beeping sounds while nurses rush wearily from bed to bed in the crowded ward. The hospital attendants set up yet another bed in the walkway of the ward as there are no more beds available to receive the new patients that the doctor has just admitted.

Overcrowded wards are unfortunately an all too familiar occurrence in public hospitals, especially in urban areas. This congested environment is not conducive to patients' overall recovery especially for those who require space and long-term support for convalescence.

Statistics obtained from the Hospital Management Information System (2010) had shown that ten Ministry of Health hospitals had consistently high bed occupancy rate of more than 85% while one hospital reportedly had 110% bed occupancy rate.

With this situation appearing to escalate, the research team at the Institute for Health Management (IHM) went to five hospitals with the highest bed occupancy rate to assess and identify solutions for overcrowding.

The researchers found that many did not need round-the-clock nursing care and they could in fact be discharged. Many patients remained in hospital because they were on medications or physiotherapy that needed some level of monitoring. What was possibly needed in the above situation are step down care centres where patients can continue to be managed from outside of an acute care setting.

Reduced congestion of the maternity ward in Tawau hospital.

Too Much Space

The researchers from the IHM, on the other hand, were presented with yet another challenge of MOH hospitals with low bed occupancy rate. In 2012, the World Bank Public Expenditures Review for Health Sector reported on the issue of low bed occupancy of smaller hospitals in Malaysia. Recommendations were made to the MOH to look into the possibility of converting them into primary care centres or ambulatory care centres.

In response to this, the IHM researchers assessed the situation in 22 hospitals in Malaysia with a Bed Occupancy Rate below 40% (7 in Peninsular, 5 in Sabah and 10 in Sarawak). They found hospitals with near empty wards but had large crowds at the specialist clinics and also at the outpatient clinics that covered rehabilitative care, dental care as well as maternal and child care. This group of hospitals had most of their resources and staff directed towards outpatient services. They also sent out questionnaires surveys, did in-depth interviews in the field and analysed secondary data from the Health Management Information System and the National Statistics Department to learn more on this issue.

The researchers noted that the hospitals with under-utilised wards were located in areas which were small or with low population density. There was also a lack of specialist services, too many beds for certain wards, and an increasing number of transfer cases to specialist hospitals. This had led to divergent issues of over-crowded and under-utilised hospitals.

Optimizing Hospital Resources: The Hospital Cluster

The Hospital Cluster revolves around the concept whereby a group of three or more hospitals in the same geographical location within a state share common resources, facilities, manpower and equipment to provide better patient flow and services, thus operating more efficiently with safe and quality medical care.

This innovative model sees an over-utilised congested hospital taking the lead role in a cluster of three hospitals. Two or more under-utilised hospitals within close proximity of the lead hospital will serve as step-down care centres for the lead hospital - effectively diverting patients who are on stable, long-term therapy away from over-crowded specialist hospitals. This makes way for new patients who require intensive care from health professionals at the lead hospitals, without compromising the care and attention needed from the stable patients on long-term therapy.

This concept would address the issue of overcrowding of hospitals and hospitals with low bed occupancy rates by redistribution of services, which would then strengthen step down care services as well as enhance clinical leadership and hospital management.

The Hospital Cluster was proposed as one of the main initiatives under the Medical Development Division and a pilot project at three states was started at the end of 2012, compromising Cluster Pahang (HoSHAH, Hospital Jerantut and Hospital Jengka), Cluster Melaka (Hospital Melaka, Hospital Alor Gajah and Hospital Jasin) and Cluster Sabah (Hospital Tawau, Hospital Kunak and Hospital Semporna).

Virtual ward round using the skype between specialist from Hoshas and non-lead hospital.

Collaborative Efforts

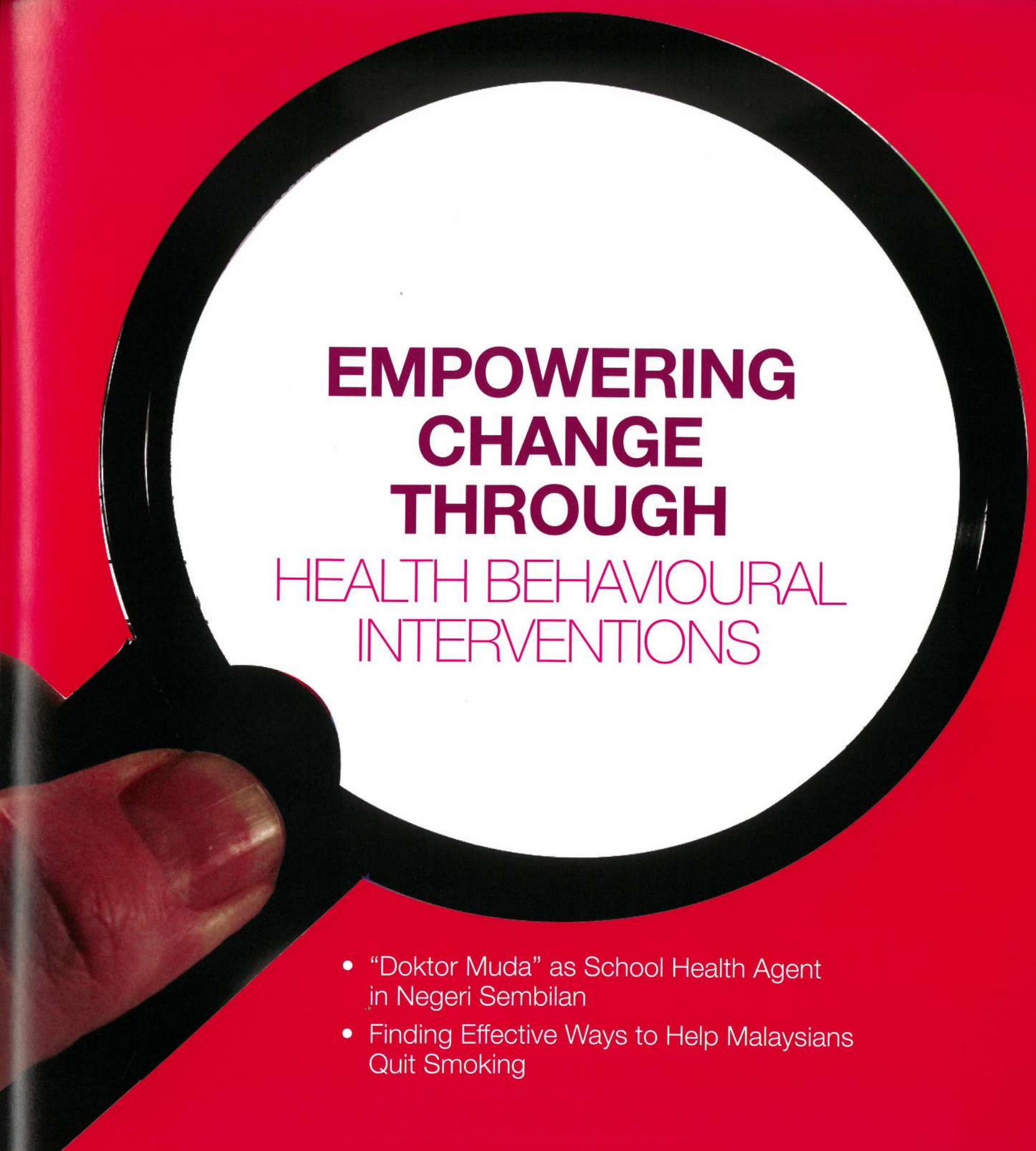
The collaborative efforts of the IHM and the Medical Development Division have turned this concept into reality. The implementing team first proposed this concept in early 2012 as one of the initiatives under the Transformation of Malaysian Healthcare System and successfully obtained approval for implementation from the *Jawatankuasa Pemandu Perancangan KKM* (MOH Steering Committee on Planning) in early 2014.

Three Clusters were set up in Pahang, Melaka and Sabah. Pahang Tengah Cluster consisted of Sultan Haji Ahmad Shah (Hoshas) Hospital, Jengka Hospital and Jerantut Hospital whilst Melaka Cluster consisted of Melaka Hospital, Alor Gajah Hospital and Jasin Hospital. Sabah Cluster consisted of Tawau Hospital, Kunak Hospital and Semporna Hospital. For Pahang, the chosen specialty for the Cluster Hospital initiative was General Medicine and Emergency services. Meanwhile, Melaka Cluster focused on Plastic and Reconstructive Services, General Surgery, Orthopaedic and General Medicine. Due to consistently high (>120%) bed occupancy rate, obstetric is the specialty of choice for Sabah Cluster.

Two years post-Cluster Hospital implementation, the main objective of overcoming the issue of over-congestion in all three lead hospitals, namely Temerloh, Tawau and Melaka Hospitals had been achieved. In addition, Melaka Cluster has succeeded in cutting the waiting time for arterioveno fistula (AVF) from 24 weeks to 12 weeks by diverting the AVF procedures to be performed at less congested Jasin Hospital. Since 2015, Kunak Hospital's operating theatre has been in operation after the obstetric medical officers had been privileged and credentialed to perform obstetric procedures. For Pahang Cluster, the number of specialist visit to the non-lead hospitals had increased. Thus, more rural patients in Jengka and Jerantut Hospitals were seen by the specialists at the local district hospitals without to travel to Temerloh Hospital.

In conclusion, positive impacts had been reflected on the variety and quality of services offered to the patients. Moreover, the key performance indicators for the respective hospitals had improved tremendously. Lastly, the benefit on the staff can be seen with the improvement in the level of knowledge and skills of the healthcare personnel post-Cluster Hospital implementation

Hospitals under Melaka cluster.



EMPOWERING CHANGE THROUGH HEALTH BEHAVIOURAL INTERVENTIONS

- "Doktor Muda" as School Health Agent in Negeri Sembilan
- Finding Effective Ways to Help Malaysians Quit Smoking

"Doktor Muda" as School Health Agent **in Negeri Sembilan**

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Ask any child, and she will most likely tell you that she will be more willing to listen to her friends than her teachers or parents. The influence that peers have on children is undeniable and widely acknowledged. Recognizing the possibility for peer-to-peer education, in 1996, a *"Doktor Muda"* (Young Doctors) programme was introduced as part of the Integrated School Health Programme. Established by the Ministry of Health (MOH) and Ministry of Education (MOE), the Integrated School Health Programme aims to nurture positive attitude and healthy practices by increasing knowledge in personal hygiene, encourage healthy lifestyle and provide healthy school environment. Adapting from the WHO (2005), the programme employs an integrated approach and collaborates with the public, private sector, local and school community to achieve a healthy school.

However, for "Doktor Muda" to be competent agents of change, they themselves must first be equipped and trained, with sufficient knowledge and skills.

Doktor Muda managing the health booth.

Young Agents of Change

The *"Doktor Muda"* programme engages school children as health agents. The programme enables the school children to achieve better health by improving the children's health knowledge and skills. In addition, MOH (2008) describes the trained *"Doktor Muda"* to be able to assist teachers and health personnel to conduct school health activities and encourage parents' involvement in health matters.

However, for *"Doktor Muda"* to be competent agents of change, they themselves must first be equipped and trained, with sufficient knowledge and skills. Thus, researchers from the Institute for Health Behavioural Research (IPTK) set out to assess the selection of message delivery methods by *"Doktor Muda"*.

Hand washing demonstration.

The researchers focused their assessment in Negeri Sembilan where they looked at the message delivery of 54 *"Doktor Muda"* and 416 of their Standard 6 peer recipients from seven primary schools, using a self-administered questionnaire assessment. Included in the assessment were topics on message delivery methods, frequently chosen topics, barriers in delivering messages, confidence in delivering topics and perception of peers towards the benefits of the programme and the *"Doktor Muda"*'s abilities to deliver health messages.

The True Picture

The most commonly presented topics by the *"Doktor Muda"* include personal hygiene, oral health and healthy eating. The peer educators tended to speak less regarding mental health and adolescent health, perhaps reflecting their unease and unfamiliarity with the topics.

While successful in helping *"Doktor Muda"* to increase their own knowledge on health and personal hygiene topics and to build up their confidence, the programme actually fell short of the peer recipient's expectations. For example, *"Doktor Muda"* preferred to deliver health messages via personal approach, public speaking and demonstration methods, but the peers preferred more interactive approaches such as games, quizzes and exhibitions.

One important topic that the researchers assessed was barriers to message delivery for both peer educators and peer recipients. The *"Doktor Muda"* claimed that the biggest obstacle in the delivery of the message was the lack of attentiveness from their peers. Despite having received training, about 30% of the *"Doktor Muda"* did not fully understand the topic or message they were tasked to deliver. On the peer recipients' end, close to 70% claimed that it was difficult to understand the message their *"Doktor Muda"* friends were trying to convey. Despite that, the majority of peer recipients agreed that the activities conducted by *"Doktor Muda"* were beneficial to their health and they would be interested in participating in future activities conducted by *"Doktor Muda"*.

Throughout this study, the IHBR researchers realized that there seemed to be a disconnect between the needs and wants of both peer educators and peer recipients, which could potentially alter the effectiveness of the programme. As such, the researchers suggested several recommendations to further improve the programme.

Researcher with respondents.

Concrete Steps Forward

Firstly, the IHBR researchers recommended that the message be delivered through a fun method, for example, through games. Secondly, it is very important for the *"Doktor Muda"* to be given the opportunity and space to improve their message delivery methods. Perhaps more importantly, it will be more effective for the *"Doktor Muda"* to be given the opportunity to tailor a method of delivery that they can excel in. The *"Doktor Muda"* required sufficient training to understand the content and topics they are tasked to deliver. This will help them to gain more confidence in delivering health messages. The researchers also found that message delivery is the most efficient when the *"Doktor Muda"* carry out information sharing activities when the topic contents are still fresh in their minds. Last but not least, the researchers suggested for peers to be given the opportunity to select their *"Doktor Muda"* representatives among themselves as this will ensure that the programme is truly "From Pupils, For Pupils, To Pupils". By conducting the study and providing pertinent recommendations, researchers from the IHBR are helping to improve and make a stalwart programme more relevant to the needs of the nation's younger generation.

Finding **Effective Ways** to Help Malaysians **Quit Smoking**

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The Difficult First Step

Taking the first step is the hardest and most important effort towards behavioral change. This is especially true for smokers. While advice on smoking cessation could fall on deaf ears for those who chose to be ignorant of the dangers of smoking, the slightest whisper of aid for smoking cessation could make a difference for someone who is ready to quit smoking.

The Ministry of Health (MOH) Malaysia recognizes the struggle faced by smokers who are ready to take the next step towards a healthier lifestyle and currently provides smoking cessation therapy in the form of behavioural counselling and medication. Malaysia as a signatory as well as a party to the WHO Framework Convention for Tobacco Control implements a comprehensive approach to reduce the number of smokers in the country including increasing cigarette tax, expansion of smoke free areas and offering cessation services.

While advice on smoking cessation could fall on deaf ears for those who chose to be ignorant of the dangers of smoking, the slightest whisper of aid for smoking cessation could make a difference for someone who is ready to quit smoking.

Healthcare personnel providing health behavioural intervention to client for smoking cessation.

Making Smoking Cessation More Effective

Not resting on their laurels, researchers in Malaysia are constantly finding ways to make smoking cessation more effective for Malaysians. One such initiative is carried out by the Institute for Health Behavioural Research (IHBR). Guided by the United Kingdom NHS Centre for Smoking Cessation and Training (NCSCT), Standard Treatment Plan that has been proven effective to increase cessation rates, the researchers set out to evaluate the effectiveness of the UK NCSCT Standard Treatment Plan, compared to the current smoking cessation therapy employed at MOH facilities.

Most smoking-cessation clinics in the public hospitals currently offer brief intervention based on the 5 A's model (Ask, Advise, Assess, Assist and Arrange). In comparison, the UK NCSCT Standard Treatment Plan combines behavioural change techniques (BCT) with evidence based pharmacotherapy. In this plan, those undergoing smoking cessation therapy have their carbon monoxide (CO) measurements taken regularly and receive proper advice on medication use. Ample opportunity to have a frank discussion on difficulties in quitting, relevant coping mechanisms and relapse prevention strategies. An ex-smoker identity is also established for those on this plan.

The researchers enrolled newly registered smokers attending quit smoking clinics from 19 hospitals in Malaysia for the study. Three hundred and thirty (330) patients from ten hospitals designated as the intervention group received NCSCT behaviour modification, whereas 172 patients from nine control hospitals received standard MOH smoking cessation service. Staff members of the smoking cessation clinics in the intervention hospitals were trained to deliver the UK NCSCT Standard Treatment Plan whereas the staffs from the control hospitals were given a refresher course on smoking cessation based on the existing modality of treatment.

A Promising New Intervention

While both intervention and control groups shared very similar demographic characteristics such as age, occupation and sex, level of nicotine dependency, smoking habits and motivation to quit smoking. At 6th month follow up, the intervention group which used the NSCST Standard Treatment Plan showed a higher follow-up and CO-verified quit rate compared to the control group, 53.3% vs 23.3% and 50.6% vs 40.0%, respectively.

Evidence to Generate More Effective Strategies

In addition to finding evidence that the UK NCSCT Standard Treatment Plan is more effective in helping smokers quit, the researchers also discovered important information such as reasons for quitting, reasons for lapse and situations where study respondents found most challenging to resist smoking. These pivotal information will help the MOH in designing effective smoking cessation interventions towards smokefree generation by year 2045.

Monitoring of client's CO level using smokerlyzer.

National Institutes of Health
Ministry of Health Malaysia

www.**nih**.gov.my

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