EDITORIAL

Research Priorities: Future Challenges

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Introduction

Malaysia has achieved remarkable advances in health. Its population, which currently stands at approximately 22 million, is expected to grow and stabilize at 31 million by the year 2020. Life expectancy at birth has increased from 56 years in the 1950s to 69.3 years for males and 74 years for females currently. The infant mortality rate has decreased from 84/1,000 live births in 1960 to 10.1 in 1996. Other health indicators like our maternal mortality rate of 0.2/1000 live births, a healthcare coverage of 95% for Peninsular Malaysia and 70% for Sabah and Sarawak, an immunization rate of 100% for BCG, 93% for DPT and Polio, 85.5% for measles and 90.7% for hepatitis B for the target populations have all been very impressive and achieved despite the Government spending only 3% of GNP on health. Our healthcare system has gained international recognition as one of the more successful systems among developing nations.

Health has always been an integral part of our development. Challenges in development occurs as a result of complex interactions between man and nature, with biological, environmental and socio-behavioural factors playing a major role. Many issues are important and pose challenges to science and technology. These issues include the environment, population dynamics and migration, urbanization, industrialization, social behavior, food supply and nutrition; in essence, the interaction between health and development.

Health development of the future will depend on the quality of our research as health research can influence the formulation of the national health policy. According to the Council on Health Research for Development (COHRED), the role of health research is to diagnose health problems, facilitate new technologies, facilitate policies and actions and advance basic knowledge. Health research should focus on health problems, which contribute substantially to the burden of disease in the community, represent a substantial cost burden to the healthcare system and have the potential of posing significant risks to the health of the community.

Research Achievements

It is difficult to measure the impact research has on the overall health system. Useful and practical impact indicators that are needed to gauge benefits from health research have yet to be formalized. We therefore have to fall back on output indicators to evaluate our research achievements since the start of the 5-year development cycles. Table I provides information on some of the direct and indirect outputs of Intensification of Research in Priority Areas (IRPA) funded projects. A total of 1,044 research projects have been successfully completed since the initiation of the IRPA mechanism in the 5th Malaysia Plan (5MP) until 1998 (mid-way of the 7MP).

The establishment of the National Institutes of Health (NIH) is major step towards strengthening the research component of the Ministry of Heath (MOH). It is a mechanism to bring together under one umbrella two existing and three proposed institutions in order to create a seamless continuum from identification of research priorities and research questions through carrying out the research to utilization of the research results in health policy formulation, health management, health promotion and development of better tools for the diagnosis and treatment of nationally important diseases. The existing two institutions are the Institute for Medical Research (IMR) and the Public Health Institute (PHI). The IMR will focus on biomedical research and PHI will be the national focal point for Health Systems Research (HSR). The three

Table I
Outputs of IRPA Funded Projects

Indirect Output	5 MP	6 MP	1996 - 1998	Total
Publication	352	842	539	1,733
Unpublished Reports	61	NA	110	171
Oral Presentations	NA	540	280	820
Poster Presentations	NA	86	124	210
Postgraduate Training	73	147	177	397
Local linkages	25	56	81	255
Foreign linkages	61	126	108	295
Direct Output	**5 MP**	**6 MP**	**1996 - 1998**	**Total**
Data/Information	NA	141	121	262
New methods/technique	NA	101	109	210
New reagents/kits	NA	26	120	126
New equipment	NA	NA	4	4
Algorithm/Software	NA	0	3	3
Products commercialized	NA	8	5	13
Products with potential To be commercialized	NA	0	45	45
Patents registered	3 (1)	19	0 (2)	22 (3)

IRPA = Intensification of Research in Priority Areas
NA = Not available
( ) = Pending

other new institutes are the Institute of Health Management (IHM), the Institute of Health Promotion (IHP) and the Network of Clinical Research Centres (CRC). The IHM will be the Ministry's training centre in management for their professional staff; the IHP will be a training and research centre in health promotion and the CRC will co-ordinate all clinical trials and be the training centre for clinical research in the MOH hospitals. New entities like the Environmental Health Research Centre at the IMR may be incorporated in the NIH in the future with the increasing importance of environmental issues.

Several initiatives have been introduced by the Government to encourage research and development in the private sector. These include special tax incentives and research grants for the Industry to facilitate the transfer of research results into new products or new processes or to effect increased productivity. Facilitating commercialization of research results, funding of high technology equipments, acquisition of patent rights, buying prototypes and sourcing of experts, repatriation of Malaysian scientists working abroad and setting up the Biotechnology Directorate and the Malaysian Industry-Government Group for High Technology (MIGHT) are other initiatives taken by the government to bolster research and enhance interest amongst our researchers.

Skills to introduce evidence in clinical decision making and to perform research in important health problems affecting the population have to be developed especially in an environment of competitive funding for research. Evidence-based health care must be made accessible to all healthcare providers to encourage them to take this approach. The Ministry of Health, through the National Institute of Health (NIH) of Malaysia will be setting up a centre for Clinical Excellence (CCE) to ensure greater transparency and accountability of clinical practices using the strengths of available and credible scientific evidence as the yardstick. The setting up of the CCE with the collaboration of the Network of Clinical Research Centres and the Evidence-based Unit of the Public Health Institute will promote greater professionalism and self regulation amongst our healthcare providers and have an impact on healthcare costs.

Quality and Continuous Quality Improvement (CQI) have been integrated into all health programmes and healthcare system of the MOH. The private sector is encouraged to be involved in formalized Quality Assurance (QA) programmes and be as committed as the MOH in on-going and planned quality improvement methods and research. The results of the Second National Health Morbidity Survey have been disseminated widely to health policy makers and managers for effective utilization. The findings of the Survey have being used frequently to guide policy makers; health managers and healthcare providers make important policy and clinical decisions and generate original publications in peer-reviewed journals.

The IRPA mechanism has facilitated the conduct of research based on national priorities. IRPA funds however are limited, as the Health Sector has to compete with other sectors. Research funds have also being obtained through WHO, the pharmaceutical industries and other international agencies. Malaysia is becoming a major player in Phase III multi-centre clinical trials and is beginning to be involved in major multi-centre Phase II clinical trials as well. All aspiring clinical researchers in Malaysia are now required to have Good Clinical Practice (GCP) by attending formalized GCP training and adhering strictly to the Malaysian Guidelines on GCP which was launched in November 1999.

Research in the New Millennium

Health research must be given the highest priority to address the challenges of the 21st century. Research findings can then be used to formulate health policies and initiate strategies to improve the health of the nation by increasing effectiveness, efficiency, and efficacy, improving equity, enhancing quality and reducing costs. The evidence-based approach to clinical practice, public health interventions and health management have often been mentioned but much needs to be done to ensure that there is a mechanism for evidence-based approach to be accessible and fully utilized. Research priority setting is necessary for the identification of research projects that will promote health and development on the basis of national needs, equity and social justice. Steps in research priority setting include the identification and involvement of all stakeholders in health and the conduct of situational analysis to identify research gaps, rank research areas, identify types of research, specify research questions and culminating in the implementation of research. Monitoring of implementation and periodic re-evaluation of research priorities are equally important steps for follow-through. The 10 target areas identified as research priorities for the 8th Malaysia Plan (2001-2005) at a national conference participated by all stakeholders of health are health problems associated with lifestyle changes, health problems associated with demographic changes, occupational and environmental health, communicable diseases, new technologies in health, health systems and industries, medical biotechnology, clinical research, herbal medicine, and products and nutrition and food safety.

The world is now a global village and the process of globalization will exert its impact on our services, finance, investment, science and technology, people and disease. Malaysia must be prepared to play a major collaborative role with other countries especially in areas of common interest. This may offset some of the financial and trained manpower constraints plaguing the respective countries. Globalisation may also lead to a migration of highly trained local researchers who seek greater research challenges in more established research centres elsewhere. It is imperative for Malaysia therefore to improve its research infrastructure and culture to enable our scientists and researchers feel relevant, motivated and interested.

The challenges to the provision of healthcare such as population aging, rising patient expectations and the advent of new technologies, while being obvious in developed countries, are beginning to affect developing countries. While grappling with the unfinished agenda of diseases of poverty, we will have to deal with the consequences of lifestyle habits such as cigarette smoking, substance abuse and dangerous driving, all of which predominate, in the developed societies of the 20th century.

The pattern of diseases is changing the world over, including developing countries like Malaysia. The reasons for the change include changes in human demographics and human behaviour, technological

advances, environmental changes, ease and rapidity of international travel, microbial adaptation and breakdown of public health measures. Emerging and re-emerging infections are particularly relevant to us in the light of the recent viral encephalitis outbreaks in our country. Jay Epstein from the FDA once declared that "a case anywhere is a case here" because of the ease and rapidity of modern transportation. An estimated 400 million travelers will exist this year. An outbreak due to a known or unknown pathogens carried by any one of them may have dire consequences to our nation as a whole. In Malaysia, diseases associated with poverty and malnutrition are gradually being replaced with diseases associated with lifestyles and affluence and include chronic diseases like coronary heart disease and cancers.

Rural-urban transmigration and the migration of foreign workers have caused an inequitable distribution of the population density in relation to resources. Changes in demography have resulted in an increasing number of the elderly. In 25 years, 8.3% of the Malaysian population is expected to be more than 65 years of age. Economic development, which has brought about greater wealth though industrialization and urbanization, is invariably accompanied by overcrowding, environmental pollution with adverse effects on health. Environmental threats like global warming, ozone depletion, toxic waste can undermine the safety and quality of our food, water, air, land and the living and working environment. Social and behavioral changes have contributed to accidents at work, domestic violence, substance abuse, stress, psychiatric diseases, all of which can affect morbidity and result in a reduced quality of life.

Emerging or re-emerging infection is defined as one that has recently appeared in a population or had existed in the past but is rapidly increasing in incidence. Such an infection can be due to a new pathogen (e.g. HIV), an old pathogen that is only recently discovered (e.g. *H pylori*) or and old pathogen with acquired antibiotic resistance (e.g. Vancomycin resistant enterococci and MRSA). The recent viral outbreaks in Malaysia have given us a preview of what can happen in the 21st century. There is a need to prepare ourselves for diseases we are either not familiar with or diseases we have never recognised before. A global initiative in terms of greater collaboration is necessary to ensure an integrated, a well-coordinated and comprehensive strategy to combat this problem.

The re-emergence of Ebola haemorrhagic fever in Zaire in 1995, plague in India in 1994, diphtheria in Eastern Europe and the spread of Hantavirus beyond Asia, including the major epidemic hantavirus pulmonary syndrome in USA are some examples of diseases that have crossed geographical boundaries. It is estimated that the hantavirus pulmonary syndrome will infect 30 - 40 million people by the year 2000. Ecologic and economic transformations have facilitated closer contact between humans and rodents. Reforestation and golf courses have created an environment that is agreeable not only to affluent golfers but also to ticks, putting them and others at risk of contracting tick-borne diseases such a Ehrlichiosis and Borreliosis (Lyme disease).

New viruses since 1973 include the Rotavirus (discovered in 1973) which causes infantile diarrhoea worldwide), the Parvovirus B19 (1975) which causes a serious form of blood disorder, the Ebola virus (1977) which causes the nasty Ebola haemorrhagic fever and the Hantaan virus (1977) which also cause a deadly haemorrhagic fever with kidney involvement. The Human T-lymphotropic virus 1 (HTLV-1) (1980) which causes a form of lymphoma/leukemia, the HTLV-II virus (1982) which causes the Hairy cell leukemia and HIV) (1983) which causes AIDS are other examples. Three new hepatitis viruses have also been discovered. These are the Hepatitis E virus (1988), the Hepatitis C virus (1989) and the Hepatitis G/GBV-C virus (1995). More recently there were reports of the Avian influenza A H5N1 virus (1997) which causes influenza with severe systemic complications and the Nipah virus, first discovered in Malaysia in March 1999, which causes encephalitis. Mechanisms employed by theses viruses include horizontal gene transfer (i.e. the transfer of gene by infection between species that are unrelated). While this was once thought to be confined to animals, we now know that such transfer can also occur between animals of different species. Humans may also be implicated to form this chain.

On a global scale, there appear to be two major problems with regards to infectious diseases that are emerging and

re-emerging infections and increasing antimicrobial resistance. The WHO has adopted four major strategies to deal with emerging infectious diseases. These include strengthening global surveillance of infectious diseases, rebuilding international infrastructure which is necessary to recognise, report and respond to emerging and resurgent infectious diseases, fostering applied research and enhancing the international capacity for infectious disease prevention and control.

The world is becoming a knowledge society and information is available to stimulate innovative research ideas. Increase health care costs and greater consumer expectations and demands are playing a greater role in the determination of our research priorities. The MOH is committed to its eight health service goals which are wellness focus, person focus, informed person, self care, care provided at home or close to home, seamless and continuous care, tailored services and effective, affordable an efficient services. With the shift towards the wellness paradigm and efforts to empower individuals to be responsible for their own health, knowledge is fundamental and in itself can trigger further research ideas, including behavioural research. The important challenge for all stakeholders in health is the intelligent use of research evidence when making clinical and policy decisions. Not all research findings of course will merit implementation. Prioritization is necessary based on the scientific quality of research conducted, its relevance to the Malaysian situation, the availability of resources and cost considerations.

Essential National Health Research (ENHR) is an integrated and systematic approach for organizing and managing specific local health problems in order to promote health and development on the basis of equity and social justice. ENHR also guides health policy formulation and programme development. Research funds for ENHR are limited and the NIH will be collaborating with COHRED to help source funds for ENHR.

The revolution in information and communication technology will affect the way we practice and human values and behaviours will be tested and exploited to the fullest. New technologies include diagnostic and screening techniques, therapeutic interventions and techniques for drug delivery, surgical interventions, information technology and telecommunications. New technologies put significant pressure on the limited financial resources necessitating the need for health technology assessment prior to its application in our healthcare delivery system. Research into the cost-effectiveness of new technologies will assist health technology assessment committees provide the justification for shifts in practice. Telehealth is the integration of information technologies, telecommunication technologies, human-machine interface technologies and health technologies to deliver healthcare and to promote the health status of the people. Telehealth is an enabler to achieve our health service goals. The focus of the future is focused on the people and services, with technology playing a key-enabling role. Telehealth will facilitate and enhance the quality of health research.

Disease management is an approach to patient care that emphasizes coordinated, comprehensive care along the continuum of disease and across health care delivery systems. Evidence-based medicine (EBM) is an approach to practice and teaching that integrates pathophysiological rationale, individual clinical expertise and patient preferences with valid and current clinical research evidence. Development of disease management programmes can be positively influenced by EBM. Many disease management strategies have concentrated on chronic conditions associated with high costs, both in terms of the burden of suffering and resource utilization. Evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients'. This involves "integrating individual clinical expertise with the best available external clinical evidence from systematic research". Evidence based health care is the conscientious use of current best research data in making decisions about the care of individuals or the delivery of health services.

There is a growing recognition that clinical research needs to define and focus on the outcomes of medical care, which are important to patients. Previously, the focus is on survival and physiologic impairment. The trend now would be to concentrate on functional status, health status, quality of life, process-of-care measures

and quality of death. There is therefore a need to shift our research focus towards continuous quality improvement and patient-centred outcomes. More partnerships, strategic alliances and regional linkages are required to facilitate technology transfer. Commercialisations of research findings through smart partnerships with private agencies and multinational companies are inevitable as fund and resources are limited. Any form of research conducted in this country which help produce new technologies, equipments or techniques should be encouraged with a view to commercialization. Researchers involved in such innovative projects should be appropriately rewarded.

Developing countries like Malaysia should invest in the "best buys" concept where indigenous technology is used to exploit the local market to offset the stiff competition from developed countries e.g. investing in product research and development in tropical diseases like malaria which is more relevant in this region and will therefore not interest developed countries but will still be a viable initiative in this region. Local experts must accelerate efforts to invest in local product research and development. Pre-requisites for such investment include infrastructure building, appropriate technology, genesis of indigenous technology and research capability strengthening. Viable partnerships with the academia, government and the industry, need to be forged to capitalize on the new government initiatives and facilitate the processes involved in such efforts. Malaysia too is a potential market for the production of herbal medicinal products. More than 1,200 plant species have been identified for potential medicinal qualities. Several initiatives have been taken to expand herbal research with close collaboration of various related research institutions Efforts to venture into drug discovery through the acquisition of technology for high throughput screening and combinatorial chemistry have been initiated in 1998. The participation of private pharmaceutical companies will facilitate transfer technology, taking through compounds through the development process, including clinical testing and successful registration of the product.

Malaysia is to be a developed nation by the year 2020. To be a centre of excellence, research findings generated in this country must be reliable and universally accepted and major multinational companies should have no qualms investing huge funds in medical research in our research institutions. To achieve this status, we must ensure that all our researchers have valid GCP training and our laboratories achieve international IO25 standards for Good Laboratory Practice (GLP).

Conclusion

Many challenges await us in the 21st century. Countries with weak fundamentals, poor research infrastructure and a lack of research capability may not be able to grapple with these challenges. Malaysia has taken the initiative to plan and persevere in anticipation of such challenges over the last decade. The NIH concept that was introduced in the 7MP is a move to manage our health research better. Intensification of health research, improving our research capacity and capability, ensuring adequate research funding and utilization of research findings are important issues that will have to be addressed in the 8 MP. Taking advantage of the establishment of NIH, forging smart partnerships with other major research institutions and making optimal use of the government's initiatives and incentives to facilitate drug discovery and development using our own natural products, will help Malaysia to be a major international player in health research.