Malaysian Family Physician 2008; Volume 3, Number 1
ISSN: 1985-207X (print), 1985-2274 (electronic)

Online version: http://www.ejournal.afpm.org.my/

Review Article

MANAGING CHRONIC DISEASES IN THE MALAYSIAN PRIMARY HEALTH CARE – A NEED FOR CHANGE

AS Ramli *MBBS (Newcastle-upon-Tyne), DFFP (UK), DRCOG (UK), MRCGP (UK),* Faculty of Medicine, Universiti Teknologi MARA (UiTM), Selangor, Malaysia

SW Taher, *BSc.Med.Sc (St. Andrews), MBChB (Glasgow), M.Med (Fam. Med UKM)*
Klinik Kesihatan Simpang Kuala, Alor Setar, Kedah, Malaysia

Address for correspondence: Dr Anis Safura Ramli, Senior Lecturer & Family Medicine Specialist, Primary Care Medicine Discipline Coordinator, Faculty of Medicine, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia. Email: rossanis_yuzadi@yahoo.co.uk

ABSTRACT
Chronic diseases are the major cause of death and disability in Malaysia, accounted for 71% of all deaths and 69% of the total burden of disease. The WHO in its report *Preventing Chronic Disease: A Vital Investment* has highlighted the inaction of most governments of the low and middle income countries in tackling the problem urgently, is clear and unacceptable. The acute care paradigm is no longer adequate for the changing pattern of diseases in today's and tomorrow's world. An evolution of primary health care system beyond the acute care model to embrace the concept of caring for long term health problems is imperative in the wake of the rising epidemic of chronic diseases and its crushing burden resulting in escalating healthcare costs. Compelling evidence from around the world showed that there are innovative and cost-effective community-based interventions to reduce the morbidity and mortality attributable to chronic diseases, but these are rarely translated into high quality population-wide chronic disease care. This paper describes the current situation of chronic disease management in the Malaysian primary care setting – to highlight the need for change, discuss the barriers to the implementation of effective chronic disease management programmes in the community, and consider fundamental solutions needed to instigate the change in our setting.
Keywords: Malaysia, chronic disease management, primary health care
Ramli AS, Taher SW. Managing chronic diseases in the Malaysian primary health care – a need for change. Malaysian Family Physician. 2008;3(1):7-13

INTRODUCTION

The disease profile of the world is changing at an alarming rate. Chronic diseases include heart disease, stroke, cancers, chronic respiratory diseases, diabetes and mental disorders are now accounted for 47% of the global burden of disease and 60% of all deaths.[1] World Health Organisation (WHO) in its groundbreaking report *Preventing Chronic Diseases: a Vital Investment* shows that 80% percent of chronic disease deaths occurred in the low and middle income countries and 50% of these deaths occurred prematurely in people under 70 years of age, disputing the long-held notions that chronic diseases are mainly affecting affluent countries and older generations.[2] In Malaysia, WHO estimated that chronic diseases accounted for 71% of all deaths in 2002, using calculation based on the standard methods to maximise cross-country comparability.[3] The first Malaysian Burden of Disease and Injury Study showed that the top two leading causes of deaths in the year 2000 for both sexes were ischaemic heart disease and cerebrovascular disease; and the total years of life lost for the Malaysian population in 2001 was 1.7 million years with almost two-thirds of this burden of premature deaths resulted from chronic diseases.[4] Of the total burden of disease measured using Disability Adjusted Life Years (DALYs), approximately 69% was contributed by chronic diseases.[4]

Globalisation, urbanisation, population ageing, as well as general policy environment has been identified as the underlying determinants responsible for the changing pattern of diseases in developing countries.[2] Malaysia is of no exception in terms of the effect of urbanisation, as an estimated 63% Malaysians now live in urban areas.[5] Although only 6.6% of Malaysians are aged 60 years and above, the ageing population is projected to gradually rise as the life expectancy at birth for both males and females has increased over the years to 70.6 years for males and 76.4 for females in 2005.[5] Preliminary data from Malaysian Non-Communicable Disease (NCD) Surveillance 2005/06 estimated that approximately 11.6 million Malaysian adults aged 25-64 years were having at least one risk factor for chronic diseases and only about 3% did not have any risk factor.[6] A recent national survey which sampled more than 16,000 Malaysians, showed that the prevalence of hypertension amongst those aged 30 years and above has increased from 32.9% in 1996 to 40.5% in 2004,[7] while the overall prevalence of obesity amongst those aged 15 years and above was 11.7% in 2006, which is a staggering increase

Malaysian Family Physician 2008; Volume 3, Number 1
ISSN: 1985-207X (print), 1985-2274 (electronic)

Online version: http://www.ejournal.afpm.org.my/

by 280% since the last National Health and Morbidity Survey II (NHMS II) in 1996.[8]

Given the dramatic upsurge of chronic diseases and their risk factors, this paper aims to describe the current situation of how chronic diseases are managed in the Malaysian primary health care to highlight the need for change, discuss some of the barriers to the implementation of effective chronic disease management programmes in the community, and consider fundamental solutions needed to instigate the change in our setting.

CHRONIC DISEASE MANAGEMENT IN THE MALAYSIAN PRIMARY HEALTH CARE SYSTEM: CURRENT SITUATION

The defining features of primary care practice – that is, continuity, comprehensiveness and coordination[9] – can potentially be the cornerstone of high quality medical care much needed by patients with chronic conditions. Evidence has shown that if effective primary care and coordination are lacking, patients with chronic conditions are at increased risk of hospitalisation, adverse drug reactions and complications.[10,11] While population-wide approach forms the central strategy for preventing chronic disease epidemics, it remains pertinent that this should be combined with comprehensive, integrated and coordinated care at the primary care level, focusing on those at high risk and those with established diseases.[2] The *World Bank Report 2007: Public Policy and the Challenge of Chronic Noncommunicable Diseases* shows that prevention and control of chronic diseases by public health policies and primary care interventions were more cost-effective when compared to secondary and tertiary care interventions.[12]

Malaysia has a multiethnic population of 26 million and is classified as an upper middle income country by the World Bank in 2003, based on its Gross National Income (GNI) per capita. It spends 4.3% of its Gross Domestic Product (GDP) towards health in 2006.[13] Primary health care has been declared as the thrust of health services since the documentation of 7th Malaysia Plan in 1996 and it is presently provided by both the public and private sectors.[14] The public primary health care sector is the main service provider where the total primary health care expenditure was 58.4% of the total health care expenditure in 2006.[13] Significant progress has also been made in terms of infrastructure where there are 809 Health Clinics, 1919 Community Health Clinics, 95 Maternal and Child Health Clinics, and 168 Mobile Clinics sprawled all over the country.[15] Services are highly subsidised at minimal or no cost to the patients and are delivered by team members consisting of doctors, paramedics, nurses and other support staff. A large proportion of public primary health care facilities are not equipped with electronic clinical information system but significant progress is now being made since the Teleprimary Care (TPC) project has been piloted in 4 different states in Malaysia.[16] The second major provider of primary health care services is the private sector where there are approximately 8,000 private general practitioners and private primary care clinics have been mushrooming throughout the country, especially in urban areas, to a total of 7454 in 2004.[15] These clinics are largely run by either single-handed or a group of 2-3 general practitioners, often without the complement of allied health care staff. Out of the 7454 private primary care clinics, approximately 800 are currently equipped with various discrete electronic medical record systems which are not designed to communicate with one another.[17] Payment for the services provided are largely borne by the patients or their employers.

In Malaysia, most people with chronic diseases are already receiving their care at the primary care level. Data from the TPC project for predicting utilisation of health services showed that a larger proportion of patients with chronic medical conditions received their care at the public primary care clinics as compared to private clinics (the data from the private clinics may not be representative due to the small number).[16] Better quality data is needed to make a valid comparison between the public and private primary care sectors with regards to the morbidity patterns, resource utilisation and practice patterns. In terms of quality of care for chronic conditions, results from numerous primary care based studies and audits have consistently showed that substantial proportions of these patients have not received effective therapy and do not achieve optimal disease control.[7, 18-22] A recent national study on hypertension showed that only 34.6% were aware of their hypertensive status; and of the 32.4% who were taking antihypertensive medication, only 26.8% had their blood pressure under control.[7] A diabetes study in private primary healthcare in Malaysia showed that only 12% of the patients had their HbA_{1c} measured in the preceding 12 months and >80% were not satisfactorily controlled; and this was associated with high prevalence of complications.[20] A cross-sectional study of lipid profiles of patients with diabetes mellitus at a public primary health care centre showed that dyslipidaemia was still under-treated and of those receiving treatment, only 22% achieved the treatment target for LDL-C level. [22]

Sporadic efforts are being made in the public primary care sector to manage chronic diseases such as diabetes and hypertension in a more systematic way using care teams while most of the other problems including chronic respiratory conditions are still being managed in 'walk-in' general clinics. Widespread implementation of multidisciplinary team approach for chronic diseases is often hampered by acute shortage of trained personnel. Currently, there are only 160 Family Medicine Specialists (FMS) covering 12% of the public primary

Malaysian Family Physician 2008; Volume 3, Number 1
ISSN: 1985-207X (print), 1985-2274 (electronic)

Online version: http://www.ejournal.afpm.org.my/

health care clinics throughout the country. This situation is made worse when only 1097 of 2126 Medical and Health Officers (M&HO) posts are filled, and 129 nutritionists recruited out of 191 available posts. Drug availability is still limited, especially the newer and more expensive agents. National disease registry projects e.g. for hypertension (Hi-Trax) and diabetes (DiMer), are at different stages of being piloted, but the progress is very slow as most of the public primary health care clinics lack information technology (IT) capacity. In the private sector, even though most clinics offer care for chronic conditions such as hypertension, diabetes and asthma, they are generally underused by patients due to the high cost of long-term treatment and absence of organised funding mechanism. These clinics are mainly equipped to react to acute illnesses with the majority of the workload revolves around diagnosing and relieving symptoms.[16]

On the whole, the current Malaysian primary health care system is still oriented towards the care of acute, episodic illnesses as well as maternal and child health. Chronic disease management, be it in the public or private setting, is still largely being done in a sporadic, unplanned and uncoordinated manner. Discrete healthcare providers often duplicate laboratory and radiological investigations as medical records are not shared between providers. There is also no regulation that requires patients to be registered with a primary care doctor, thus they tend to move freely, hopping from one doctor to another. This situation, undoubtedly, contributes further to the fragmentation and duplication of care. Previous policy and focus on maternal and child health has resulted in commendable achievements with regards to the increase of life expectancy at birth as well as in reduction in the maternal and infant mortality rates.[15] Although the Ministry of Health (MOH) has introduced policy changes pertaining to chronic disease management in primary care in recent years, implementation of successful programmes is hampered by the lack of human resources and inefficient system which remains oriented towards acute care.

FACING THE CHALLENGES: DIRE NEEDS OF PRIMARY CARE SYSTEM REFORM

Numerous high quality and evidence-based chronic disease management models have been developed over the past decade.[23-27] The most notable of these models, is the Chronic Care Model (CCM) which has been shown to successfully change healthcare practices for chronic conditions in many developed countries.[27,28] In response to the growing chronic disease burden in the low and middle income countries and the ensuing need to help these countries to transform their healthcare systems, the WHO convened the representatives from these countries to expand the Chronic Care Model (CCM) [27] into the Innovative Care for Chronic Conditions (ICCC) Framework (Figure 1) which is more relevant and applicable to the low and middle income countries.[23]

The ICCC Framework illustrates the complementary nature of working across the disease continuum in a comprehensive way. It centred on the concept that optimal outcomes occur when a health care partnership triad is formed among patients and families, health care teams, and community partners.[23] The framework functions at its best when each member communicates and collaborates with the other members of the triad at all levels of care and becomes informed, motivated, and prepared to manage chronic conditions.[23] Positive policy environment is paramount and should encircle and support community efforts that are formally connected to health care organisations.[23]

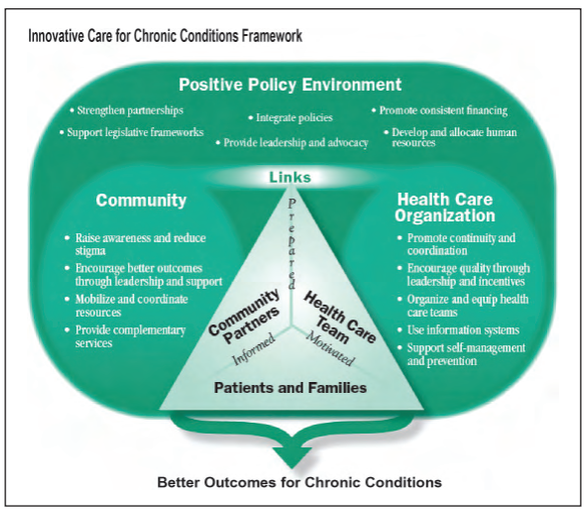
Both the CCM and ICCC Framework provide specific strategies for creating innovations in the care of chronic conditions. Regardless of resource level, every health system can take action to improve health care for chronic conditions.[23] Compelling evidence on successful implementation and quality outcomes of innovative programmes in low, middle and high income countries are available from around the world.[29-34] A nurse-led chronic disease management programme for high blood pressure, diabetes, asthma and epilepsy established in a rural South African setting has been shown to improve disease control in 68% of the hypertensive patients, 82% of those with diabetes and 84% of those with asthma.[29] An innovative programme that taught physicians new skills in communication and disease management has been shown to improve health status and lower health care cost of low-income asthma patients.[31] In resource-poor setting of Peru and Haiti, patients with little formal education and few material resources can successfully manage complex medical regimens for drug-resistant tuberculosis or HIV/AIDS when provided with self-management support and careful follow-up.[32]

Given the compelling evidence on cost-effective interventions and innovative management of chronic conditions, the failure to use this knowledge to instigate a change in the current primary health care system is unjustified. Both the CCM and ICCC Framework offer specific strategies for creating innovations to transform the care of chronic conditions in the Malaysian primary health care system.

Malaysian Family Physician 2008; Volume 3, Number 1
ISSN: 1985-207X (print), 1985-2274 (electronic)

Online version: http://www.ejournal.afpm.org.my/

Figure 1. The WHO Innovative Care for Chronic Conditions (ICCC) Framework[23] (reproduced with permission from WHO)



Top-down policy change and implementation

Change has to be instigated at all level from political decision-makers (macro level), health care organisations and community leaders (meso level), and health care personnel, patients and families (micro level). Each group has its own roles and scope of influence. Every person is responsible to become an agent of change. A new paradigm of thinking is needed at all level for transformation towards care for chronic conditions to be successful, which will fundamentally lead to an informed and motivated partnership among stakeholders at each level.

To be most effective, change should start at the macro level. Measurable improvement in the care of patients with chronic conditions will only occur if system leaders make it a priority and provide the leadership, incentives and resources necessary to make improvements happen.[28] Although some efforts and changes has been made by Malaysian policy makers pertaining to primary care management of chronic diseases in recent years, there is still an urgent need to conduct high quality research to study the barriers of implementations in more detail. High level commitment and investment is also needed to ensure successful expansion of the TPC project which would provide data to ensure a fairer distribution of financial allocation guided by disease burden and cost-effective interventions. Although the total primary health care expenditure has consistently increased from RM9.6 billion in 2003 to RM14.2 billion in 2006,[13] simply adding capital to an already ineffective primary health care system is not going to significantly improve the quality of care and outcome for chronic conditions.[23] Fundamental reform to integrate the public and private primary health care sectors to become one system is crucial before meaningful outcome can be achieved. A policy to produce highly trained and competent primary care doctors and allied health care personnel should also be high on the agenda.

At the meso level, concerted efforts should be made to set up dedicated multidisciplinary care teams for chronic diseases throughout the country. Multidisciplinary healthcare teams, centred on primary health care, has been shown to be highly effective to improve coordination of care, disease control and health outcomes.[35,36] The authority needs to ensure that the range of laboratory tests and equipments needed to diagnose and monitor; and the required drugs to control chronic diseases are available in primary care. Expansion of the TPC project is crucial to link all health care providers across sectors. Well-designed, locally relevant and sustainable clinical information systems are essential to achieve the goal of coordinated long term care by creating disease registry, organising patient information, planning and tracking patient care.[37] Although locally relevant evidence-based clinical guidelines are already available for most major chronic diseases in Malaysia, they are mainly disseminated to the public primary care sectors. The implementation of such guidelines at the primary care level, especially in the private sectors is still abysmal. Clinical guidelines must be integrated within the structure of day-to-day clinical decision making process to ensure successful implementation.[38]

At the micro level, it is imperative that health care personnel develop quality long-term relationships with patients and their families. The traditional role of patients as passive recipient of health no longer holds true and emphasis must now be upon them and their family's central role to take active responsibility to become an effective partner in managing their conditions.[39] Self-management programmes have been shown to reduce the severity of symptoms, improve confidence, resourcefulness and self-efficacy of patients with chronic conditions.[40] It should therefore be advocated and supported through effective patient education. Healthcare workers must ensure that patients have adequate information and skills to manage their chronic conditions.

This concept highlight a new paradigm in the current clinical practice and therefore, requires effective communication abilities, behavioural change techniques, patient education and counselling skills of primary care workforce to care for patients with chronic conditions. This underscores training needs in these areas for doctors, both at the undergraduate and postgraduate level, as well as for the allied health care personnel.

Development of human capital – addressing training deficiencies

Currently, almost all of the public and private universities in Malaysia have integrated Primary Care/Family Medicine training in their undergraduate curriculum. However, there should be a greater emphasis to highlight the escalating

Malaysian Family Physician 2008; Volume 3, Number 1
ISSN: 1985-207X (print), 1985-2274 (electronic)

Online version: http://www.ejournal.afpm.org.my/

chronic disease burden and the concept of chronic disease management in the undergraduate primary care curriculum. Great emphasis should also be placed on communication skills and consulting skills training, which includes patient education and counseling throughout the undergraduate and postgraduate curriculum.

Rigorous call should be made for more medical graduates to specialise in Family Medicine to address the current shortage of FMS. Until recently, the Masters in Family Medicine (MMed Family Medicine) offered by three public universities was the only recognised specialist qualification for Family Medicine in Malaysia, while the recognition of vocational training programme for private primary care doctors leading to the joint Membership of Academy of Family Physician Malaysia (MAFP) and the Fellowship of Royal Australian College of General Practitioners (FRACGP) had been protracted over the last 30 years. The year 2007 has finally seen this key milestone being accomplished when this qualification received its recognition from the Family Medicine Specialty Subcommittee of the National Specialist Register.[17] This highly overdue recognition, together with the personal-to-holder recognition of the Membership of Royal College of General Practitioners, United Kingdom (MRCGP, UK) is seen as a great step in the right direction in the struggle to overcome the acute shortage of Family Medicine Specialists and the strive towards a seamless care between the public and private sectors.

Although postgraduate specialist training in Family Medicine has long been available, a large number of primary care doctors are still untrained as legislation does not require a postgraduate qualification before entering into primary care practice. The Academy of Family Physician Malaysia (AFPM) is developing a 2-year Diploma in Family Medicine Course for all private general practitioners, which will commence in 2009.[17] Ideally, this training should be government-funded and made compulsory to all primary care doctors. The public, private, and academic primary care sectors should rally to form a national committee on postgraduate training and actively participate in this key programme to ensure that all future generations of primary care doctors are well trained to face the growing primary care challenges including the challenge of managing chronic conditions.

Availability of trained allied health care personnel is also critical to support successful implementation of chronic disease management programmes. There should be a constant endeavor to increase the number of trained nurses and other allied health care personnel for chronic disease care, while incessantly improving the skills, knowledge and attitude of all primary health care workforces to deal with the challenge of chronic disease management through continuous professional development training courses.

Integration of public and private primary health care sectors

The integration of public and private primary care sectors in Malaysia should be high on the agenda of policy change. Care for chronic conditions needs coordination and continuity across time and health care setting, and across sectors. Traditional boundaries among levels of the system of primary, secondary and tertiary care, as well as across public and private sectors must be minimised to allow better integration to occur. Malaysia has a limited number of Family Medicine Specialists, but a large number of private general practitioners. Seamless integration and collaboration with the private primary care sector is crucial to optimise the use of available human capital to care for chronic conditions.

The proposed National Health Financing Scheme (NHFS),[41,42] with its core objective to provide universal coverage and equitable access to both the public and private health sectors, could provide an ideal platform of integration between the public and private primary health care. The Malaysian Medical Association (MMA) advocated that the NHFS should be corporatised and government-run, but it should never be privatised. It is anticipated that primary care doctors with postgraduate qualification will receive a higher remuneration under the NHFS compared to those without further training. This will indirectly induce demands on all primary care doctors to undergo postgraduate training in Primary Care.

Comprehensive benefit packages should be developed under the NHFS which include preventive care services, self-management support, chronic care and rehabilitative care services. The TPC project can ideally provide the information based on Adjusted Clinical Groups (ACG) needed to develop fair remuneration packages for the NHFS.[16] The NHFS should embrace a fair competition between the public and private primary care sectors based on access, service and quality. Quality assurance and improvement programmes which have already been advocated by the MOH and AFPM, should be integrated within the NHFS. Institutionalised system of quality assurance, which include ongoing clinical audit has been proven to be an effective tool to improve quality and outcomes.[43] Financial incentives for improved performance that ties in with quality outcome should also be introduced in the NHFS. The United Kingdom stands out as a leader in this regard where the introduction of financial incentives has been shown to be associated with substantial quality improvement for the incentivised conditions.[44,45] It is also timely that legislation should be passed to require patients to be registered with one primary care doctor to facilitate effective coordination and continuity of care. This measure will also reduce wastage of resources as well as enhance comprehensive primary care delivery.

Malaysian Family Physician 2008; Volume 3, Number 1
ISSN: 1985-207X (print), 1985-2274 (electronic)

Online version: http://www.ejournal.afpm.org.my/

CONCLUSION

It is imperative that the increasing magnitude of chronic disease burden is anticipated, understood and acted upon urgently. Chronic disease prevention and control can no longer be ignored as an important means of economic development. Primary health care with its defining features of continuity, comprehensiveness and coordination, is the cornerstone to provide high quality and cost-effective chronic disease care to the population. Despite significant progress made in developing the infrastructure, primary health care service in Malaysia, be it in the public or private sector, is still oriented to acute, episodic illnesses as well as maternal and child health. The system largely remains that way despite the increased prevalence of chronic diseases. Major impediments to execute successful chronic disease management programmes in the current system are the lack of high quality research to study barriers of implementation of the various policies made pertaining to chronic diseases, slow expansion of electronic clinical information systems to achieve the goal of coordinated care, lack of universal funding mechanism to ensure equitable access to healthcare, fragmentation of primary health care services into public and private sectors, lack of compulsory formal postgraduate training for the majority of primary care doctors and shortage of trained allied health care personnel to care for chronic conditions.

We need top-down stewardship and strong commitment by national leaders, policy makers, health care organisations, community leaders, health care personnel, and patients and families, on quality primary health care that focus on prevention and control of chronic diseases. The solution lies in every person at all levels to become an agent of change by embracing a new way of thinking regarding chronic disease care and to take serious actions on each of the problems highlighted. As long as the acute care model dominates health care systems, health care expenditure will continue to escalate without meaningful improvements in populations' health status.[23] Through innovative application of the ICCC Framework as advocated by the WHO, primary health care system in Malaysia can potentially maximise its returns from limited resources by shifting from an acute to chronic care model. The health of our future generation will depend on our ability to successfully redesign our primary health care system that can meet the needs of a growing population of patients with chronic conditions.

REFERENCES

1. WHO. The World Health Report 2003: Shaping the future. Geneva: World Health Organisation, 2003. Available from URL: http://www.who.int/whr/2003/en/ [Accessed 2008 Feb 13]
2. WHO. Preventing chronic diseases: a vital investment [online].Geneva: World Health Organisation, 2005. Available from URL: http://www.who.int/chp/chronic_disease_report/full_report.pdf [Accessed 2008 Feb 13]
3. WHO. The impact of chronic disease in Malaysia [online]. Geneva: World Health Organisation, 2005. Available from URL: http://www.who.int/chp/chronic_disease_report/media/impact/malaysia.pdf [Accessed 2008 Feb 13]
4. Yusoff AF, Kaur G, Omar MA, Mustafa AN. Malaysian burden of disease and injury study 2005. Institute for Public Health, National Institute of Health, Malaysia. Available from URL: http://www.globalforumhealth.org/filesupld/forum9/CD%20Forum%209/papers/Yusoff%20F.pdf [Accessed 2008 Feb 13]
5. Department of Statistics Malaysia [online]. Available from URL: http://www.statistics.gov.my/ [Accessed 2008 Feb 13]
6. MOH. NCD Surveillance 2005/06: Report on NCD risk factor in Malaysia. Ministry of Health, Malaysia. Available from URL: http://www.dph.gov.my/ncd/surveillance/index.php?option=com_content&task=view&id=20&Itemid=36[Accessed 2008 Feb 13]
7. Rampal L, Rampal S, Azhar MZ, Rahman AR. Prevalence, awareness, treatment and control of hypertension in Malaysia: a national study of 16,440 subjects. *Public Health*. 2008;122(1):11-8
8. Rampal L, Rampal S, Khor GL, *et al.* A national study on the prevalence of obesity among 16,127 Malaysians. *Asia Pac J Clin Nutrition*. 2007;16(3):561-6
9. Safran DG. Defining the future of primary care: what can we learn from patients? *Ann Intern Med*. 2003;138:248-55
10. Wolff JL, Starfield B, Anderson G. Prevalence, expenditure and complications of multiple chronic conditions in the elderly. *Arch Intern Med*. 2002;162(20):2269-76
11. Rothman AA, Wagner EH. Chronic illness management: what is the role of primary care? *Ann Intern Med*. 2003;138:256-61
12. Adeyi O, Smith O, Robles S. Public policy and the challenge of chronic noncommunicable diseases. Washington, DC: World Bank; 2007. Available from URL: http://siteresources.worldbank.org/INTPH/Resources/PublicPolicyandNCDsWorldBank2007FullReport.pdf [Accessed Feb 26 2008]
13. MOH. Malaysia National Health Accounts, 2006. Planning & Development Division, Ministry of Health, Malaysia.
14. Merican MI, Rohaizat BY. Health care reforms and changes: the Malaysian experience. *Asia Pac J Public Health*. 2002;14(1):17-22
15. Merican MI, Rohaizat BY, Haniza S. Developing the Malaysian health system to meet the challenges of the future. *Med J Malaysia*. 2004;59(1):84-93
16. Safurah J, Mohd Raili S, Fauziah ZE, *et al.* Using Teleprimary Care (TPC) data set for predicting utilisation of health services in Malaysia through use of John Hopkins Adjusted Clinical Groups [online]. Available from URL: www.wpro.who.int/NR/rdonlyres/099E65C9-00A8-4A77-A428-3E0250471085/0/MAAJohnHopkinsUniversity.pdf [Accessed May 5 2008]
17. The Academy of Family Physicians of Malaysia. 35th Annual General Meeting: Annual Report & Statement of Accounts 2007
18. Lee TW, Chan SC, Chua WT, *et al.* Audit of diabetes mellitus in general practice. *Med J Malaysia*. 2004; 59(3):317-22
19. Chan SC, Chandramani T, Chen TY, *et al.* Audit of hypertension in general practice. *Med J Malaysia*. 2005; 60(4):475-82
20. Mafauzy M. Diabetes control and complications in private primary healthcare in Malaysia. *Med J Malaysia.* 2005; 60(2):212-7
21. Zainudin BM, Lai CK, Soriano JB, *et al.* Asthma control in adults in Asia-Pacific. *Respirology*. 2005; 10(5):579-86
22. Wong JS, Tan F, Lee PY. The state of lipid control in patients with diabetes in a public health centre. *Asia Pac J Public Health*. 2007;19(3):16-21
23. WHO. Innovative care for chronic conditions: building blocks for action. Geneva: World Health Organisation, 2002. http://www.who.int/diabetesactiononline/about/icccglobalreport.pdf [Accessed February 26 2008]
24. Friedman N, Skogmo L, Aruffo P. Implementing disease management programmes within an integrated delivery system. *Dis Manag Health Outcomes*. 1999;6(6): 55-63
25. Wagner EH, Davis C, Schaefer J, *et al*. A survey of leading chronic disease management programmes: are they consistent with the literature? *Manag Care Q*. 1999;7(3):56-66

26. Wagner EH, Austin BT, Davis C, *et al*. Improving chronic illness care: translating evidence into action. *Health Aff*. 2001;20(6):64-78
27. Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness: the chronic care model, part 2. *JAMA*. 2002; 288(15):1909-14
28. Epping-Jordan JE, Pruitt SD, Bengoa R, Wagner EH. Improving the quality of health care for chronic conditions. *Qual Saf Health Care*. 2004;13(4):299-305
29. Coleman R, Gill G, Wilkinson D. Noncommunicable disease management in resource-poor settings: a primary care model from rural South Africa. *WHO Bulletin*. 1998;76(6):633-40
30. McCulloch DK, Price MJ, Hindmarch M and Wagner EH. Improvement in diabetes care using an integrated population-based approach in a primary care setting. *Dis Manag*. 2000;3(2):75-82
31. Rossiter LF, Whitehurst-Cook MY, Small RE, *et al*. The impact of disease management on outcomes and cost of care: a study of low-income asthma patients. *Inquiry*. 2000;37(2):188-202
32. Farmer P, Leandre F, Mukherjee JS, *et al*. Community-based approaches to HIV treatment in resource-poor setting. *Lancet*. 2001; 358: 404-9
33. Cheah J. Chronic disease management: a Singapore perspective. *BMJ*. 2001;323:990-3
34. Graham L, Sketris I, Burge F, Edwards L. The effect of primary care intervention on management of patients with diabetes and hypertension: a pre-post intervention chart audit. *Healthcare Q*. 2006;9(2):62-71
35. Sommer LS, Marton KI, Barbaccia JC, Randolph J. Physician, nurse and social worker collaboration in primary care for chronically ill seniors. *Arch Intern Med*. 2000;160(12):1825-33
36. Wagner EH. The role of patient care teams in chronic disease management. *BMJ*. 2000;320:569-72
37. Schoen C, Osborn R, Huynh PT, *et al*. On the front lines of care: primary care doctors' office systems, experiences and views in seven countries. *Health Aff*. 2006;25(6):w555-71
38. Grimshaw J, Eccles M, Tetroe J. Implementing clinical guidelines: current evidence and future implications. *J Cont Edu Health Professions*. 2004;24(Suppl 1):S31-37
39. Department of Health (UK). The expert patient: a new approach to chronic disease management for the 21st century [online]. Crown Copyright, 2001. Available from URL: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4006801 [Accessed Feb 26 2008]
40. Bodenheimer T, Lorig K, Holman H and Grumbach K. Patient self-management of chronic disease in primary care. *JAMA*. 2002;288(19): 2469-75
41. Kannakatu K. Healthcare financing in Malaysia. *Asia Pac J Public Health*. 2002;14(1):23-8
42. Rohaizat BY. Financing Health care in Malaysia: Safety net for the disadvantage groups including pensioners, elderly people, the poor and the disabled. *NCD Malaysia*. 2004;3(2): 43-6
43. Chambers R and Wakley G. Clinical Audit in Primary Care: Demonstrating quality and outcomes. *Radcliffe Publishing*, 2005
44. Gulliford MC, Ashworth M, Robotham D, Mohiddin A. Achievement of metabolic targets for diabetes by English primary care practices under a new system of incentives. *Diabet Med*. 2007;24(5):505-11
45. Steel N, Maisey S, Clark A, *et al*. Quality of clinical primary care and targeted incentive payments: an observational study. *Brit J Gen Pract*. 2007;57(539):449-54

Daar AS, Singer PA, Leah Persad D, *et al.* Grand challenges in chronic non-communicable diseases. *Nature*. 2007;450(7169):494-6.
http://www.nature.com/nature/journal/v450/n7169/full/450494a.html

Seven Grand Challenges in chronic diseases

A. Raise public awareness
B. Enhance economic, legal and environmental policies
C. Modify risk factors
D. Engage businesses and communities
E. Mitigate health impacts of poverty and urbanization
F. Reorientate health systems