

## BRUNEI DARUSSALAM JOURNAL OF HEALTH

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**WELCOME MESSAGE FROM VICE-CHANCELLOR  
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I am very pleased and honoured to write these opening remarks for the inaugural issue of the Brunei Darussalam Journal of Health (BJH), published by the Institute of Medicine, Universiti Brunei Darussalam.

I understand that the Journal aims to promote excellence in service, research, and education in all disciplines concerned with and related to health through publishing and disseminating results of original research; literature reviews; and commentaries, opinions, and discussions on relevant topics. The Journal also aims to fully adhere to the standards of journalistic integrity and excellence. The ultimate goal of the Journal is to contribute to the promotion of the health and well being of the people of Brunei Darussalam and beyond.

I would like to congratulate and thank the authors of the articles, members of the Editorial Board, The Institute of Medicine and all others who have made the preparation and publication of this inaugural issue possible.

I wish the Journal every success.

A handwritten signature in black ink, appearing to read 'Awang Haji Ismail Bin Haji Duraman'. The signature is written in a cursive style and is positioned above a horizontal line.

**DATO PADUKA DR. AWANG HAJI ISMAIL BIN HAJI DURAMAN**  
Vice-Chancellor

# Promoting health sciences research in Brunei Darussalam

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## 1. The changing role of medical schools

The functions of a modern medical school include not only providing the traditional undergraduate and postgraduate training in medicine, and conducting research (involving basic, strategic and applied research or medical technologies), but also supporting the national health services, the wider community, the business sector and government with appropriate expert knowledge. The latter wider functions are particularly important if government or public funding is used in supporting the medical school. In organizing its Annual Academic Sessions, the Institute of Medicine of the Universiti Brunei Darussalam aims to fulfill this expected wider societal role.

## 2. Trends in expenditure on health and medical research

The health sector consumes a major part of the budget in most countries, being approximately 9% of the Gross Domestic Product (GDP) in most Organisation for Economic Cooperation and Development (OECD) countries [Figure 1, Ref 1]. In 2003, the USA spent 15.3% of GDP on health which is slightly more than four times that spent on defence. These figures give an indication of the priority ascribed to health in many human societies. In Brunei, approximately 6-8% of the national budget is presently devoted to Health, according to available government statistics. Data available for the years 1999 to 2004 for the OECD countries are presented in Figure 1. Importantly, the OECD data show that the proportion of GDP spent on health is increasing in most countries, including those with

rapidly growing economies like Korea and Mexico [1]. In the USA, which may be regarded as being in the forefront of developing new knowledge pertaining to health, medical research is estimated to constitute approximately 5-10% of the total expenditure on health.

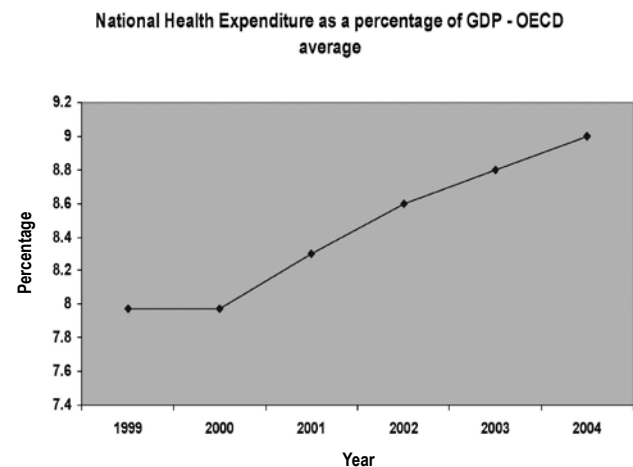


Figure 1. Graph illustrating the trend in the average national health expenditure as a percentage of the gross domestic product in countries of the Organisation for Economic Cooperation and Development (OECD) for the period 1999 to 2004 [Data from Ref 1]

## 3. Promoting research in the health sector

Much of the increase in life expectancy in 1950-2000 is generally accepted as being due to advances in medical knowledge and medical technology, and not merely the better delivery and better use of existing knowledge and technology. It is therefore useful to analyze in detail some of the benefits of promoting health research.

1. Research provides appropriate training for improving skills of health-sector personnel in evidence-based medicine
2. Solutions for local health problems are often found through what is termed applied research

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3. Improving the delivery of health care involves what is termed health systems research

4. Research that seeks to advance human knowledge for its own sake, termed basic, fundamental or blue sky research, not only satisfies the innate curiosity of the brightest minds, but has been shown to yield unexpected applications in improving medical treatment and diagnosis. The discovery of monoclonal antibodies is a well-known example. Here, Kohler and Milstein stumbled upon the method of making monoclonal antibodies while investigating the basic molecular mechanisms involved in generating diversity in antibodies [2]

5. Most medical research however falls into the category of strategic or applied research, i.e. research that is ultimately designed to improve medical technology and knowledge, which in turn translates into better health care

6. Concomitant research activity often translates into better teaching by the faculty in medical schools. It helps to maintain interest in new developments and serves to attract and retain good faculty

7. Ultimate outcome in promoting research into health is of course the creation of a healthier society

#### 4. Key components to building capacity in health sciences research

The essential components of building the capacity to perform health related research are:

1. Personnel
2. Institutions
3. Infrastructure
4. Regulatory framework
5. Investment

##### 4.1 Personnel

There is a clear correlation between the state of economic and social development of different countries and the numbers of active researchers (scientists including medical scientists and engineers). The results from the

annual United Nations Development Programme (UNDP) human development reports show the relationship between numbers of researchers and OECD countries, countries with a high human development index (regional examples are Brunei and Malaysia) and countries with a medium level of human development of which China, India, Russia and Thailand are examples [Figure 2, Ref 3]. OECD data also suggest that higher education and overall technological sophistication have a major impact on the capacity to innovate (measured in terms of patents obtained) in different countries [1].

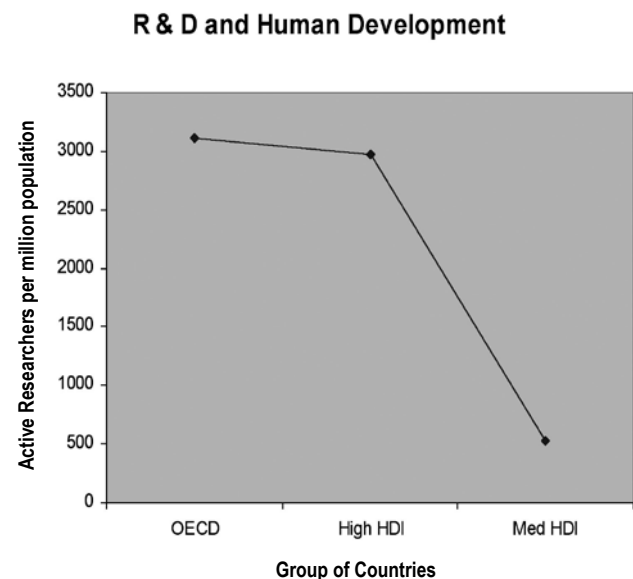


Figure 2. Graph illustrating the trend in the average numbers of researchers in the countries of the Organisation for Economic Cooperation and Development (OECD), countries with a high human development index (HDI) and medium human development index as defined by the United Nations Development Program

##### 4.2 Institutions and Infrastructure

Where research and development is carried out, and its composition, has an additional impact on innovative capacity in different countries. In many OECD countries R&D spending by business is more productive than that by government. However government tends to support basic research unlike business. Innovation productivity is higher for countries specialized in (broad) technology areas, e.g. Korea in electronics.

Universities play important multiple roles in translating funding into innovation performance, and therefore good universities with adequate financial and infrastructure support are essential for productive research. Infrastructure is not only the buildings and laboratories or workshops where research is done, but also involves less obvious factors such as reliable water and electricity supplies, transport, maintenance, rapid procurement mechanisms for laboratory supplies, good housing for staff and provision of trained supporting staff such as technicians, secretaries and managers. Therefore national infrastructure investments and policies have a significant impact on innovative output.

#### 4.3 Regulatory framework

Regulations protecting intellectual property and promoting openness to international trade also influence

innovative capacity, particularly for business. The tax incentives provided by the government to commercial establishments for performing in-house research is a significant driver for innovation in many OECD countries.

#### 4.5 Investment

Like investment in higher education for training scientists and engineers [Figure 2] correlating with the state of development in a country, there is a parallel relationship between national investment in research and development and the developmental status [Figure 3]. It is generally accepted that a minimum of 2% of the GDP of nations needs to be set aside for research and development for them to remain globally competitive in the 21<sup>st</sup> century.

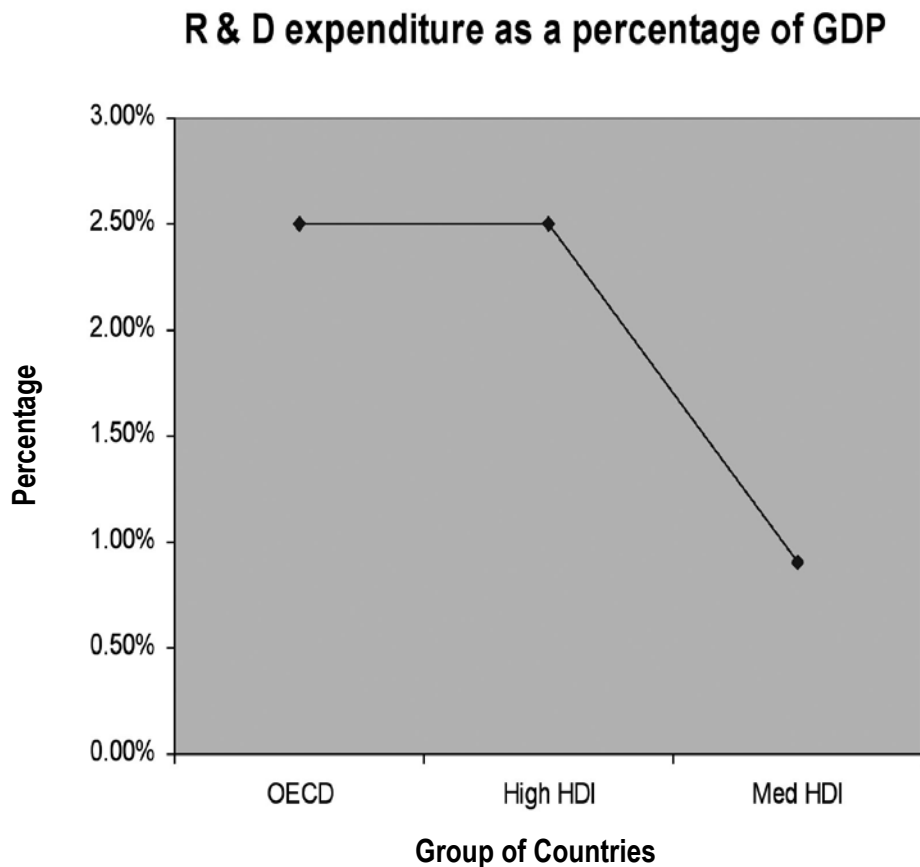


Figure 3. Graph illustrating the trend in the average proportion of the gross domestic product (GDP) devoted to research and development in the countries of the Organisation for Economic Cooperation and Development (OECD), countries with a high human development index (HDI) and medium human development index as defined by the United Nations Development Program

## 5. Requirements in Brunei Darussalam

Despite its high human development index as defined by the UNDP [1], Brunei clearly needs to develop more trained scientists for clinical and biomedical research to reach parity in research output with the OECD countries. Efforts can be made to attract medical graduates into research. However the requisite infrastructure in terms of research laboratories, major equipment, non-academic support staff, literature resources, needs to be developed in parallel to build human capacity for innovation and research.

There is also a need for specific funding for health sector research that should involve peer-review of proposals and block grants for developing infrastructure in specific fields. Additionally, collaboration with established centres of excellence in OECD countries is beneficial and desirable.

The regulatory framework should be improved further to facilitate research and innovation, e.g. purchasing speed, support on intellectual property issues, and greater freedom of interaction of staff between UBD and the Ministry of Health, and between UBD and foreign research centres

It is natural that the Institute of Medicine, UBD should play a key role in promoting health sector research in Brunei Darussalam. Well equipped laboratories and ongoing state of the art research at the Institute can attract collaboration from medical staff in hospitals and overseas scientists.

## 6. Some strategic advantages of Brunei in Health Sector research

Focusing on areas where countries have some advantages for innovative output in research is a common practice. These may be summarized in the context of the Bruneian health sector as follows:

1. Brunei has a small and easily accessible population. Good medical and personal records are maintained. This would facilitate studies on molecular epidemiology of human disease

2. The relative genetic homogeneity within distinct populations within the country is extremely useful for pharmacogenetic studies

3. The good hospital care and health sector infrastructure in the country easily permits clinical trials of new therapeutic procedures and drugs

4. The rain forests of Brunei and the surrounding seas are rich in biodiversity. There is also a local tradition of using plant extracts for medical treatment. Such traditional knowledge can provide useful leads for discovering new drugs

## 7. The way forward

The primary need in Brunei is to establish a specific fund for research in health sciences that would support relevant research at the Institute of Medicine and the Ministry of Health. This should not involve funding running costs of laboratories, but be a source of support for limited term research projects and also more generic programmes pertaining to strategic areas for development. The latter category of funding would need to be more substantial than the former. A joint committee of the Ministry of Health and the Institute of Medicine, UBD may be established to select research grant applications for funding and to develop procedures [e.g. regulatory] for an enabling research environment. Efforts should also be directed towards meeting the other requirements outlined in Section 5.

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## Adult crossed aphasia - case report and review of the literature

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### Abstract

The Broca's doctrine in the last decades of 19th century assigned the left cerebral hemisphere dominance for language to dextrals (right handed) and right hemisphere language dominance for sinistrals (left handed), establishing a strict anatomo-functional connection. However in the same period, cases were reported with aphasia having right hemispherical lesions in right handed individuals. The term "crossed aphasia" to applies to any aphasic syndrome resulting from lesions ipsilateral to the dominant hand. Peter Marien and co-workers have carefully analysed all the published cases of Crossed Aphasia in Dextrals (CAD) and laid down the criteria to classify these patients into three different groups: unreliable, possible and reliable. However, no existing theory explains the anomalous organization of neurocognitive functions in this exceptional neurobiological condition. We report the case of a patient who developed CAD postoperatively where CAD was classified according to the criteria after cognitive testing and MRI examination.

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### Introduction

The cerebral cortex of the human brain contains about 20 billion neurons spread over an area of 2.5 m<sup>2</sup> [1]. Brodmann numbered these areas according to their cytoarchitecture and ascribed them functions. Large scale neural networks connect these areas to coordinate the cognitive and behavioral functions. The neural substrate for language is centered in the perisylvian region of the left hemisphere. The Wernicke's area is the posterior pole, situated in the posterior third of the superior temporal gyrus and is concerned with the comprehension part of the speech. The anterior pole of the network, known as Broca's area is situated in the posterior part of the inferior frontal gyrus and this area is concerned with the expression part of the speech. Wernicke's and Broca's areas are connected with each other and with other association areas by the perisylvian neural network. Any lesion in these areas or

their interconnections can give rise to aphasia. Aphasia is a loss or impairment of the ability to use or comprehend spoken or written language.

The language network shows a left hemisphere dominance pattern in the vast majority of the individuals. In about 90% of right-handers and 70% of left-handers, aphasias occur only after lesions of the left hemisphere. In a small minority of right-handers, there is a right hemisphere dominance for language. A language disturbance occurring after a right hemisphere lesion in a right-hander is called crossed aphasia (Crossed aphasia in dextral).

Bramwell introduced the term 'crossed aphasia' in 1899 to denote, in a broad sense, to any syndrome resulting from a cerebral lesion 'ipsilateral' to the dominant hand [2]. Wada and Rasmussen demonstrated with sodium amytal test that in about 70% of left-handed people the left hemisphere was dominant for language [3]. Zangwill concluded after reviewing the crossed aphasia cases published in the literature that not more than 1 or 2% of right brain damaged population should suffer from CAD [4]. Brown and Wilson laid down criteria for CAD in 1973, as there were confusions in classifying the correct cases for crossed aphasia [5].

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Peter Marien and co-workers reported their criteria for crossed aphasia in dextrals after carefully analysing all the factors [6]. The following factors were considered mandatory to diagnose a genuine CAD; (1) clear-cut evidence of aphasia, (2) evidence of natural right-handedness not shifted, documented by a formal test, (3) evidence of lesion strictly confined to the right hemisphere, leaving the left hemisphere structurally intact, (4) absence of familial left-handedness or ambidexterity and (5) no history of early brain damage and or seizures in childhood. The following factors were considered for exclusion; (1) family history of left-handedness, (2) shifted right-handedness, (3) left hemisphere pathology, (4) previous neurological illness and (5) seizures in childhood

Marien and colleagues. analysed 152 cases which had been published till then and classified them as follows: 85 cases (55.9%), unreliable cases, 18 (11.8%) possible cases and 49 (32.2%)-reliable cases. We report a reliable crossed aphasia case, which fulfilled all the clinical and radiological criteria laid down by Marien and colleagues. This merits importance as there are only 49 reliable cases previously published in the world literature.

### Case Details

A 40 years old Chinese male, a known hypertensive was admitted in an unconscious state with a GCS E1, V1, and M4 - 6/15 and left hemiplegia. His CAT scan revealed a right basal ganglionic haemorrhage. He underwent an emergency craniotomy, the clot was evacuated, and he was put on ventilatory support. After weaning off from the ventilator on the 7<sup>th</sup> post operative day he was found to be suffering from global aphasia and he had left hemiplegia.

After 8 weeks, he was walking with support and his language and other cognitive functions were assessed. He was a bilingual (Chinese and English) and studied up to Form 4. His handedness was tested with the Edinburgh Handedness Inventory and he was 100% right handed. All his seven siblings and parents were right handed. He had motor aphasia with left hemiplegia. His comprehension was good, he had acalculia and his reading, and writing

were affected. His postoperative MRI brain scan did not show any lesion in the left hemisphere. He had no history of seizures or childhood neurological illness.

### Results

This patient is a right-handed individual with no family history of left-handedness. He had a right hemispheric lesion with aphasia and left hemiplegia. There was no lesion in the left hemisphere as evidenced by the imaging studies. He did not suffer any previous neurological illness or seizures. Thus he fulfilled all the criteria for a reliable crossed aphasia in dextral.

### Discussion

Crossed aphasia in dextral is an interesting neurobiological phenomenon and still there is no existing theory that explains the anomalous organization of neurocognitive functions in CAD. There has been a higher incidence in the Han ethnic group in China [7]. Bakar and co-workers studied three cases of CAD with functional imaging studies including Single Photon Emission Tomography (SPET) & Positron Emission Tomography (PET) [8]. They found extensive hypo-metabolism or hypo-perfusion in the right hemisphere with an initial reduction in left hemisphere as well. Abnormal dominance for at least some language functions in the right hemisphere underlies the syndrome of crossed aphasia. Diaschisis, or functional depression of the anatomically normal left hemisphere, was seen in all 3 patients during the acute phase, but not in patient 1 after recovery had begun. All the proven cases are undergoing neurolinguistic and neuropsychological evaluation.

CAD is an interesting rare neurobiological phenomenon. Clinicians should be able to anticipate this rare problem while managing patients who are right handed having right hemispherical lesions. Neurosurgeons should establish the language dominance before operating patients who are right handed with right hemispherical lesions. Our contribution of this case material will help the neurocognitive scientists to do further research in this area as the numbers of reliable CAD cases are small.

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# Thrombolysis for ST Elevation Myocardial Infarction in RIPAS Hospital, Brunei Darussalam: 2005 vs 1999

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## Abstract

Rapid reperfusion is critically important in the management of ST-elevation myocardial infarction (STEMI). Studies show worse outcomes with increasing delay in reperfusion therapy. UK guidelines for management of STEMI suggest administering thrombolytic treatment in eligible patients within 30 minutes of arrival at hospital, within 60 minutes of calling for professional help, and within 12 hours of the beginning of pain.

This study compares the values of several indicators of the process of thrombolysis therapy in patients with STEMI in RIPAS Hospital, Brunei Darussalam, in 2005 with corresponding values in 1999. Complete data for analysis were available for 37 patients in 2005 and 32 patients in 1999. Compared to 1999, in 2005 considerably more patients received thrombolysis within the first 4 hours of the onset of pain (50% vs. 70%) with 46% receiving it within 3 hours. The door to needle time was significantly shorter in 2005 compared to 1999. In 2005, 11% of all eligible patients received thrombolysis within 30 minutes of arrival in the hospital compared to 6.25% in 1999. Also, in 2005, 38% of the patients received thrombolysis within 60 minutes of arrival at the hospital compared to 12% in 1999. A significant reduction in the transfer time was an important factor in improving the door to needle time between 1999 and 2005.

At RIPAS Hospital, a favourable trend towards earlier thrombolysis was noted in 2005 compared to 1999. Yet, in 2005, only 46% of all eligible STEMI patients received thrombolysis within 3 hours of the onset of pain. Therefore, there is still room for improvement in our practice.

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## Introduction

Acute myocardial infarction with ST segment elevation (STEMI) is defined as necrosis of the myocardium due to rupture of a plaque and 100% occlusion of the infarct-related coronary artery [1]. Early resolution of the coronary thrombus is important for reducing the extent of myocardial necrosis [2-4]. For the management of STEMI, generally two myocardial reperfusion methods are used. The more widely available and easily administrable method is thrombolysis with fibrinolytic drugs like

streptokinase or rtPA. The other method is percutaneous coronary intervention (PCI) or primary angioplasty requiring direct intervention on the coronary obstruction. Although considered the best treatment in acute myocardial infarction, PCI is unfortunately not available at all the hospitals [5-9]. In the 1984 GISSI study, conducted for 17 months in Italy on 11,712 patients to assess the impact of thrombolytic treatment on in-hospital mortality, the treatment significantly reduced mortality by 18% and the benefit was still significant after 10 years of follow-up [10,11]. The beneficial effect of thrombolytic therapy was again confirmed by the Fibrinolytic Therapy Trialists' (FTT) Collaborative Group study in 1994 [12].

Initially, a window period of 12 hours from the first signs of STEMI was suggested for thrombolysis. But the first 3 of these 12 hours were considered the most critical

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and called 'the golden hours' [9,13]. In 1996, Boersma, Simoons, and colleagues from Erasmus University, Rotterdam, Netherlands, published an analysis of data from 1983 to 1993, to define the relation between delay in fibrinolytic therapy and short-term mortality [13]. The benefit of fibrinolytic therapy in terms of lives saved per 1,000 patients was 65, if given within 1 hour; 37, if given between 1 and 2 hours; and 26, if given after 3 hours. The Prague-2 study in 2003 showed no difference between thrombolysis and PCI among patients with presentation time of < 3 hours from the onset of symptoms [14]. The 2005 CAPTIM study in France concluded that thrombolysis for STEMI, if performed within 2 hours of the onset of pain, was as effective as PCI in terms of life saving [6]. This was later confirmed in other studies conducted in France, Scandinavia, and Italy [8, 9, 15-19].

New European and American guidelines suggest thrombolysis within 30 minutes of arrival at the hospital, within 60 minutes from the call for professional help, and within 12 hours from the onset of pain, provided no contraindications are present [7,20,21].

To assess time trends in the performance of thrombolytic therapy at RIPAS Hospital, Brunei Darussalam, we compared the values of four indicators of the thrombolytic treatment process in 2005 with their corresponding values in 1999. These indicators were pain to needle time, door to needle time, transfer time, and coronary care unit (CCU) delay.

## Methods

This study included all patients that arrived at the Accident and Emergency (A&E) Department, RIPAS Hospital, Bandar Seri Begawan, Brunei Darussalam, with STEMI and admitted to the CCU during January through December, 1999, and January through December, 2005. In RIPAS hospital, thrombolysis is initiated in the CCU rather than in the A&E Department. Relevant data were abstracted from patient files in the Cardiac Centre. Abstracted data were used to calculate the following four thrombolysis therapy process indicators:

1. *Pain to needle time*: time interval between the onset of pain and the beginning of thrombolysis therapy;
2. *Door to needle time*: time interval between arrival at the A&E Department and the beginning of thrombolysis therapy;
3. *Transfer time*: time interval between arrival at the A&E Department and transfer to the CCU;
4. *CCU delay*: time interval between arrival at the CCU and the beginning of thrombolysis therapy.

All data were computerized using Microsoft Excel and analyzed using Microsoft Excel and Stata (StataCorp LP, College Station, Texas, USA). We computed the mean, the median, and the 25<sup>th</sup> and 75<sup>th</sup> percentiles as descriptive statistics. As the study variables were not distributed normally, we used the nonparametric median test to evaluate statistical significance in the difference between two medians. We considered a p-value of <0.05 as significant.

## Results

Between January and December, 2005, 50 patients (6 females, 44 males) presented with STEMI to the A&E Department, RIPAS Hospital. The average age of the patients was 54.4 years (range 28-84 years). Of these patients, 46 were thrombolysed, 2 had primary angioplasty, and 2 died before any treatment could be administered. For inclusion in the analysis for this study, complete data were available for 37 patients in 2005 and 32 patients in 1999.

*Pain to needle time*: In 2005, 46% of the patients received thrombolytic treatment within 3 hours of the onset of chest pain, 25% within 2 hours, and 2.7% within 1 hour. These values were not significantly different from their corresponding values in 1999. The median pain to needle time was 190 minutes in 2005 compared to 243 minutes in 1999 (P=0.469, Table 1). The mean pain to needle time was 335.9 minutes in 2005 and 285.2 minutes in 1999.

Indicator	2005 (n = 37)		1999 (n = 32)		2005 vs. 1999
	Median	IQR	Median	IQR	Median test P-value
Pain to needle time (minutes)	190	150, 270	243	125, 328	0.469
Door to needle time (minutes)	65	50, 95	98	75, 137	0.003
Transfer time (minutes)	40	25, 60	55	43, 92	0.007
Coronary Care Unit (CCU) delay (minutes)	25	10, 40	33	13, 50	0.333

Table 1. The medians, interquartile ranges (IQR, 25<sup>th</sup> and 75<sup>th</sup> percentiles), and statistical significant test results of 4 selected thrombolysis therapy process indicators, RIPAS Hospital, Brunei Darussalam, 1999 and 2005.

*Door to needle time:* In 2005, the overall door to needle time was shorter than in 1999. In 2005, almost 11% of the patients were treated within 30 minutes compared to 6.25% in 1999. The comparison of median door to needle times in 2005 vs. 1999 showed significant difference. In

2005, this was 65 minutes and in 1999 this was 98 min (P = 0.003, Table 1). The mean door to needle time was 77.2 minutes in 2005 and 118.7 minutes in 1999.

Transfer time (Figures 1). There was marked and significant improvement in the transfer time in 2005 compared to 1999. The median transfer time in 2005 was reduced to 40 minutes compared to 55 minutes in 1999 (P = 0.007, Table 1). The mean transfer time was 45.7 minutes in 2005 and 95.0 minutes in 1999.

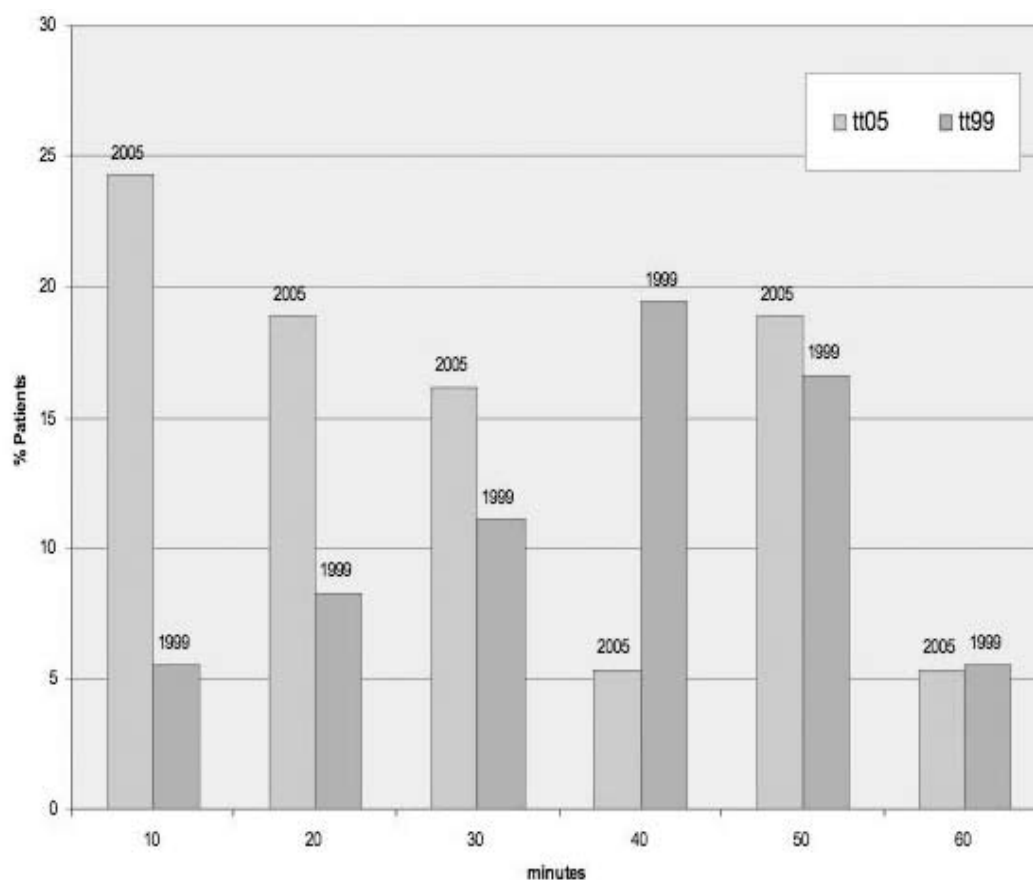


Figure 1. Percentage of STEMI patients with different transfer times in 1999 and in 2005, RIPAS Hospital, Brunei Darussalam.

CCU delay: Values of this indicator in 2005 and in 1999 did not differ significantly (Table 1,  $P = 0.333$ ). The median CCU delay was 25 minutes in 2005 compared to 33 minutes in 1999. The mean CCU delay was 30.9 minutes in 2005 and 39.2 minutes in 1999.

## Discussion

We conducted this study to assess the changes between 1999 and 2005 in the values of four important process indicators of thrombolysis therapy for STEMI in RIPAS Hospital, Brunei Darussalam. We also compared the 2005 values of the indicators at RIPAS Hospitals with international recommendations [7, 20, 21]. New European and American guidelines recommend thrombolysis for STEMI within 30 minutes of arrival at the hospital, within 60 minutes from the call for professional help, and within 12 hours from the onset of pain, provided no contraindications are present [7,20,21]. Two indicators of the thrombolysis therapy process are very important: pain to needle time and door to needle time. In 2005, 70% of all eligible patients were thrombolysed within 4 hours compared 50% in 1999. However, the median pain to needle times in these two years did not differ significantly (Table 1). In 2005, 46% of the patients were treated within 3 hours of the onset of pain. This percentage is close to that observed in the UK during a study conducted on 22,000 patients in 2005 [20]. In this study it was found that 56% of the patients were treated within 3 hours of the onset of pain. We did not compare the data on administration of fibrinolytic drugs within 60 minutes after the call for professional help as was done in the UK study, because the majority of patients seeking care for STEMI at RIPAS Hospital came directly on their own without calling for an ambulance [20].

The data from RIPAS Hospital showed that there was significant improvement in the door to needle time in 2005 (median: 65 minutes) compared to 1999 (median: 98 minutes). In 2005, almost 11% of the patients were

treated within 30 minutes of arrival at the hospital, compared to 6.3% in 1999. In 2005, the mean door to needle time at RIPAS Hospital was 77.8 minutes, a value close to those reported in some studies from Europe [5,17]. We compared our results with those of other international studies including the Myocardial Infarction National Audit Project (MINAP) study [15, 20-23]. The MINAP study was conducted in UK from 2000 to 2005 to monitor hospital performance in the management of STEMI. This study showed that in 2004, more than 80% of the patients were thrombolysed within 30 minutes of arrival at the hospital, a percentage that doubled since 2000. Although, at RIPAS Hospital we have noted that the percentage of patients thrombolysed within 3 hours of the onset of chest pain almost doubled between 1999 and 2005, in absolute terms, these percentages were much smaller than those observed in Europe.

Of the four thrombolysis therapy process indicators we have studied, the pain to needle time is highly dependant on the patients' responses. The door to needle time in turn is affected by the transfer time and the CCU delay. In RIPAS Hospital, between 1999 and 2005, significant improvement was noted in the transfer time but no change was noted in the CCU delay.

Thus, better management in the A&E Department and increased public awareness has led to an improvement in the pattern of thrombolysis for STEMI in Brunei Darussalam. These have led to significant reduction in the door to needle time and the pain to needle time.

Early thrombolysis is of critical importance in the management of STEMI. Through better organization, coordination, and optimization at every level of the therapy administration process, precious time can be saved. Public awareness and health care providers' education should play an important role in the overall strategy to improve the door to needle time and the pain to needle time. While favorable trends have been noted in the values of these indicators in RIPAS Hospital between 1999 and 2005,

there is room for further improvement to match the better performance records elsewhere.

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# Varicocelectomy in the treatment of male factor infertility- Preliminary result of a series of 38 cases in Negara Brunei Darussalam

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## Abstract

Varicocelectomy is usually performed for infertile male with oligozoospermia (less than 20 million per mm<sup>3</sup> sperm concentration) to improve the sperm quantity and quality. This study reported my preliminary result of varicocelectomy performed over the last 5 years for infertile couple in Negara Brunei Darussalam, in which only 3 out of 35 infertile couple achieved pregnancy after varicocelectomies.

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## Introduction

Infertility is an increasing problem among the married couple and male factor contributes to half of these cases. Semen in the infertile couple is increasingly abnormal over the years and this has contributed to the increasing rate of infertility world wide generally [1, Dk.Hjh Rozillah et al, unpublished]. Varicocele is a common condition and can be found twice as common in the infertile group (34%) than the normal population (17%) and can cause abnormal semen analysis. Artificial Reproductive Technique such as the intracytoplasmic sperm injection technique (ICSI) enables infertile male to father a child even in the case of severe oligozoospermia or azoospermia. Varicocelectomy performed for oligozoospermic patient achieves variable success rate [2, 3]. This study is to report my preliminary result of the varicocelectomies performed for infertile male patients.

## Patients and Methods

Cases of patients who underwent varicocelectomies from 1/8/2000 to 31/7/2005 were obtained from the operative registry in the operating theatre of RIPAS Hospital, Negara Brunei Darussalam. Their case notes were reviewed

carefully with respect to the age, preoperative sperm concentration, types of varicocelectomy and the end point of achieving pregnancy.

## Results

Altogether 38 male patients underwent varicocelectomies from 1/8/2000 to 31/7/2005, with ages ranging from 18 to 50 years with a mean age of 26. There were 16 cases who underwent open Palomo's varicocelectomies from 1/8/2000 to 30/9/2002 and 22 cases had Laparoscopic varicocelectomies from 1/10/2002 to 31/7/2005 [Figures 1-5]. Three out of these 22 cases were performed for bilateral varicocelectomies. 10 cases had sperm concentration between 0 to 10 million per mm<sup>3</sup>, 25 cases had sperm concentration between 10 to 20 million per mm<sup>3</sup> and 3 cases had sperm concentration of more than 20 million per mm<sup>3</sup>. Three cases were performed for pain with normal semen analysis and 35 cases were performed for infertility with abnormal semen analysis. A total of 3 pregnancies were achieved after varicocelectomies and this gives an 8.57% success rate in this preliminary result.

## Discussion

This small series has shown only an 8.6% success rate. A larger series and a longer follow up are required. The success rate of this group of patients may be improved if they are given the opportunities to obtain Artificial Reproductive Techniques in the treatment of infertility.

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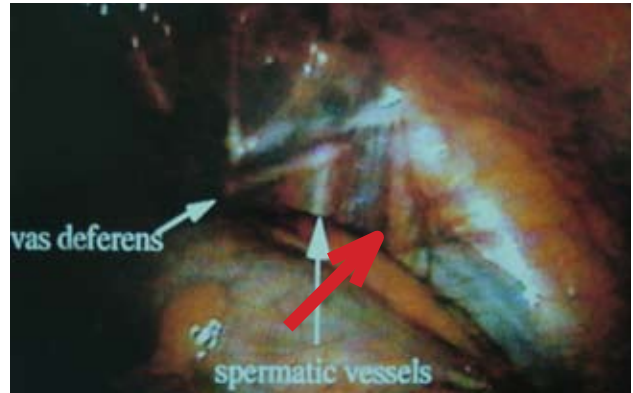
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Left Varicocele



Laparoscopic view of varic



Dissecting and clipping of varicosed testicular vein



Division of clipped varicosed testicular vein



Isolated testicular artery after division of varicosed testicular vein

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# Ureteroscopic management of ureteric stones - its efficacy and complications

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## Abstract

Before the Extracorporeal Shockwave Lithotripsy (ESWL) and Ureteroscopy, open ureterolithotomy was the only technique available for ureteric stone removal. Ureteroscopic fragmentation and removal of stone have dramatically advanced the urologist's ability to render patients stone free with one procedure. Our Urology unit was established on 1<sup>st</sup> of March, 2005 and since then we have treated 25 patients with ureteric stones via ureteroscopic procedures. Altogether 27 procedures were performed because 2 patients had a repeated ureteroscopic procedures few months later. Nineteen patients were successfully treated ureteroscopically, 2 had cystolithotripsy instead as a result of migration of the stones into the bladder, 1 needed conversion to open ureterolithotomy because of physical restriction and 4 had uneventful ureteroscopy as the stones migrated up to the kidney and 1 had ureteric stricture dilated. Nine cases were stented with DJ stents for 1 case of perforation, 2 cases of mucosal trauma, 3 cases of stone migration upstream and 3 cases of residual stones. Ureteroscopic procedures are efficient as the primary management of ureteric stones because it is quick, less invasive than conventional open method and it renders patient stone free with one procedure most of the time. Our result shows that ureteroscopy is safe and the perforation rate

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## Introduction

Ureteroscopy is a minimally invasive surgery using an endoscopic technique where a surgeon passes a thin viewing instrument (ureteroscope) into the bladder and then up the ureter to the location of the ureteric or kidney stone. The kidney stone was then removed using forceps or basket while larger stones may need fragmentation before removal. Before Ureteroscopy and the Extracorporeal Shockwave Lithotripsy (ESWL), open ureterolithotomy was the only technique available for ureteric stone removal. And hence ureteroscopy fragmentation and removal of stones have dramatically advanced the urologist's ability to render patients stone free with one procedure only. Although more invasive than ESWL, ureteroscopy with small, rigid or flexible endoscopes is the most efficient technique for treatment and removal of ureteric stones (Grasso and Bagley, 1998). Patient desiring a single procedure with maximal efficacy should consider primary ureteroscopy.

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The idea of an endoscopic technique in urology was started by Hugh H. Young in 1912 when he passes a rigid cystoscope into a dilated ureter of a patient with posterior urethral valve. But it was not until 52 years later when a smaller fiberscope is introduced into the ureter to visualize the ureteric stone by Victor F. Marshall. There are more recent advancements since, such as the flexible ureteroscopes with Holmium Yag laser lithotriptors and the Hopkins rod-lens system.

## Materials and Methods

Our Urology Unit in the Raja Isteri Pengiran Anak Saleha (RIPAS) Hospital was established on the 1<sup>st</sup> of March, 2005 and since then we have treated 25 patients (from 1/03/2005 – 12/01/2006) with ureteric stones via ureteroscopic procedures. We performed a retrospective search on these patients to evaluate the efficacy of the above method. There were 18 men and 7 women were treated with the age range between 31 – 71 years old (mean age 40.48). Out of which, 12 of them presented with lower ureteric stones, 6 middle ureteric stones, 3 upper ureteric stones, 1 multiple stones along the ureter (stainstrasse), 1 bladder stone, 1 ureteric stricture and 1 diagnostic ureteroscopy.

## Results

Altogether 27 procedures were performed because 2 patients had a repeated ureteroscopic procedures few months later. And 19 were successfully treated ureteroscopically, 2 had cystolithotripsy instead as a result of migration of the stones into the bladder, 1 needed conversion to open ureterolithotomy because of physical restriction and 4 had uneventful ureteroscopy as the stones migrated up to the kidney and 1 had the ureteric stricture dilated. Nine cases were stented with Double-J stents for 1 case of perforation, 2 cases of mucosal trauma, 3 cases of stone migration upstream and 3 cases of residual stones. The only major complication we encountered was the 1 case of perforation which was safely and successfully stented.

## Discussion

Our Retrospective study confirmed that ureteroscopic procedures are efficient as the primary treatment of ureteric stones and other pathology – 24/27 (88.89%). It is quick, less invasive than the conventional open method and it renders patient stone free with one procedure most of the time. Our results show that ureteroscopic procedure is safe and the perforation rate of 3.7% which is equivalent to other reported series (<5%).

Ureteroscopy has gained widespread use for diagnosis and treatment of diseases in the supravescical urinary tract. Diagnostic indications for ureteroscopy include:

- Evaluation of radiologic filling defect within the upper urinary tract
- Evaluation of haematuria arising from the upper urinary tract
- Evaluation of unilateral positive cytology
- Surveillance of patients with upper tract urothelial malignancy treated endoscopically

While its therapeutic indications include:

- Fragmentation and extraction of stones
- Incision of ureteral or ureteropelvic strictures
- Ablation or resection of localized low-grade and low-stage urothelial malignancy
- Removal of foreign bodies located within the upper urinary tract

Figures 1-3 show some typical ureteric stones.



Figure 1. Left upper ureteric stone at the level of L2 transverse pro



Figure 2. A right ureteric stone at the level of L2 transverse process



Figure 3. A left vesicoureteric stones

There are complications arising from doing the procedure and these includes: ureteral perforation, ureteral stricture, submucosal or “lost” stones, ureteral false passage, ruptured balloon dilator, ureteral avulsion, bleeding and sepsis. However owing to smaller, less traumatic ureteroscopes, improved intracorporeal lithotriptors and better understanding of the principle of ureteroscopy, the number of complications from doing ureteroscopy and the management of ureteric stones have decreased steadily.

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# Transplant of autologous bone marrow stem cells in ischemic heart disease

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## Abstract

The objective of this study was to evaluate the feasibility of intramyocardial injections of autologous bone marrow stem cells as sole therapy for patients with ischemic heart disease. The methods involved a prospective, non randomized study in 4 symptomatic patients who had severe ischemic heart disease, which was not amenable for conventional revascularisation methods. Aspirates of 500ml bone marrow were extracted from the iliac crests. A mean of  $2.4 \times 10^8$  autologous bone marrow stem cells were delivered to the patients by direct intramyocardial injections at 30-40 sites as predetermined by the preoperative technetium scan. There was no mortality at mean follow-up of 14.3 months (range from 10 to 22 months). The New York Heart Association (NYHA) functional classification improved from a mean of 3.2 preoperatively to a mean of 1.5 and 1.0 at 1- and 4-month follow-up, respectively. The ejection fraction from two-dimensional echocardiography changed from  $51 \pm 7\%$  to  $62 \pm 4\%$  and the percentage of myocardial defect altered from  $73 \pm 23\%$  to  $23 \pm 41\%$  at 4-month follow up. Periodic holter monitoring showed no early or late arrhythmias.

Direct delivery of high numbers of autologous bone marrow cells via intramyocardial injections in severely ischaemic patients is feasible and not associated with death, myocardial infarction or cerebrovascular incidents. One year following this intervention qualitative measures suggested improvements in the patients' cardiac function and reduction in their associated cardiac symptoms. A longer follow up is necessary to establish the long-term efficacy of this approach and to investigate whether there are any late arrhythmias.

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## Introduction

Coronary artery disease remains one of the main causes of morbidity and mortality in the world. Despite advances in medical treatment and improvements in revascularisation techniques, thousands of patients are still not amenable to these treatments thus denying them a symptom-free life. For the past few decades researchers have been attempting to develop and utilise cellular therapy to rebuild or revascularise the heart [1-3]. Early clinical trials have shown that implantation of autologous bone marrow cells

was feasible with improvement in ischaemic status and left ventricular function [4-11]. Indeed this technique has the potential to become one of the emerging new modalities for treatment of ischemic heart disease. However, most of the previous studies with autologous bone marrow stem cells were performed with concomitant percutaneous coronary intervention (PCI) or coronary artery bypass graft surgery (CABG). In this report we describe our preliminary clinical trials and report our result on the safety and feasibility of direct intramyocardial injections using high cell count of autologous bone marrow stem cells as a sole therapy for severe ischaemic heart disease.

## Methods

This was a prospective non-randomized clinical trial. All patients who had severe ischemic heart disease with stable angina that was refractory to maximum medical therapy and not amenable for percutaneous or surgical

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revascularization methods either because of diffuse disease or the target vessels were too small, were eligible for recruitment. This has to be validated by an independent interventional cardiologist and cardiothoracic surgeon. Additional inclusion criteria include the presence of myocardial reversibility as confirmed by preoperative technetium scan. This study was approved by the institutional ethical committee and informed consent was obtained from all the patients. Exclusion criteria included: life expectancy of less than a year, active malignant neoplasm, alcohol or drug dependency, severe diabetic retinopathy, poorly controlled diabetes and those requiring concomitant open-heart procedures. Since September 2003, four patients were enrolled.

#### *Preoperative screening*

All patients had a repeat coronary angiogram within a month of the procedure to ensure that the coronary arteries were not suitable for percutaneous coronary intervention or surgical revascularization and this was assessed by an independent interventional cardiologist and cardiothoracic surgeon. During cardiac catheterization, left ventriculogram was performed to measure the left ventricular ejection fraction (LVEF), left ventricular end-diastolic pressure (LVEDP), left ventricular end-systolic volume (LVESV) and left ventricular end-diastolic volume (LVEDV) were measured. A SPECT (single photon emission computed tomography) myocardial perfusion-imaging scan using Gamma camera (GE model Optima nx dual detector) was used to detect areas of defect or reversibility. A one day stress-rest or rest-stress protocol was performed. Exercise treadmill (Bruce's protocol) or intravenous dobutamine infusion was aimed at achieving a target heart rate of more than 85%. Then 10-15 mCi of technetium ( $^{99m}\text{Tc}$ -tetrofosmin) was injected. After about half-hour later, images were acquired over 15 minutes (stress scan). About 3 to 4 hours later another 25 to 30 mCi of technetium scan was injected again. Patient was rested for 45 minutes to one hour before a second scan was acquired (rest scan). Data was collected in optical disc with Dicom compatible format with HP (Hewlett Packard) Kayak as workstation computer. The

areas of defect and reversibility were calculated by Cedar Sinai software. Transthoracic two-dimensional echocardiography was also used to assess the global LVEF, regional wall motions and absence of valvular abnormalities. A preoperative 24-hour holter was also used to exclude presence of any arrhythmia. A detailed computed tomography of the abdomen complimented with abdominal ultrasound, chest roentogram, faecal occult blood test, urinary analysis and serum tumor markers such as carcinoembryonic antigen (CEA) CA19-9 and alpha feto protein (AFP) were done to exclude the presence of malignancy. Eye assessment was done by independent ophthalmologist to exclude presence of severe diabetic retinopathy. Blood sugar monitoring in particular glycosylated hemoglobin and fasting blood sugar were optimized prior to the procedure.

#### *Bone Marrow Aspiration*

This was done on the same day of the intramyocardial injection. Patients were anaesthetized with full intubations and placed in prone position. The patient was heparinised with monoparin (heparin sodium bovine, CP Pharmaceuticals) 70 iu/kg body weight just prior to the commencement of the bone marrow harvest. The marrow was aspirated using Islamic needle from both the posterior superior iliac crests. Aliquots of 3-5 mls were aspirated each time. The marrow was then deposited into ACD (acid-citrate-dextrose) and heparinised collection bag. At the start of the harvest, 20mls of ACD and 20mls of hepsal (hepsal = 15,000 iu of preservative-free heparin in 500mls of normal saline) were added into the empty collection bag (Fenwal Bone marrow Collection Kit, Baxter Healthcare Corporation). This combination was sufficient to anticoagulate 100mls of bone marrow. After each 100mls of bone marrow collection, an additional of 20mls of ACD and 15mls of hepsal were added. A total of 500mls of marrow was collected from each patient.

#### *Isolation of Autologous Bone Marrow Stem Cells*

Following harvest of about 500mls of the marrow, the collection was sent to the pathology laboratory. A buffy coat was prepared using semi-automated cell

processor Cobe 2991. At the end of the process, the volume is reduced to about 250ml. This procedure depleted the red cells and also reduced the volume. This is later centrifuged at 4000rpm for 20 minutes at 18 degrees celsius without braking. From this about 15ml of concentrated buffy coat was then collected using an automated collection system called 'Optipress' into a transfer bag and ready for injection. Tests on the final harvest included flow cytometry (CD34, B and T-cells subset enumeration) and culture and sensitivity to check for sterility.

### Cell implantation

The patients either had a median sternotomy or lateral thoracotomy depending on areas to be injected. Direct intramyocardial injection of high cell count of autologous bone marrow stem cell was done under general anaesthesia and with the heart beating without the aid of cardiopulmonary bypass. A total of 30-40 injections with a mean number of  $2.4 \times 10^8$  cells (ranges from  $1.1 \times 10^8$  to  $4.2 \times 10^8$ ) injected directly under vision into the myocardium as determined preoperatively from the preoperative technetium scan (Table 1). The injections were spaced at about 0.5cm

Patient	Sex	Age	DM	HPT	HLP	Previous CABG	Total injections	Total cells ( $\times 10^9$ )
1	male	60	yes	yes	yes	yes	40	1.1
2	male	59	yes	yes	yes	yes	40	2.8
3	male	60	yes	yes	yes	no	31	4.2
4	male	58	yes	yes	yes	yes	33	1.3

Dm=Diabetes mellitus, HPT=Hypertensive, HLP=Hyperlipidemia, CABG=coronary artery bypass graft

Table 1. Patient clinical characteristics and intraoperative data

from each other using 27 gauge needle. There were no complications during the injections and in particular no significant arrhythmias or bleeding were noted. No patients required conversion to cardiopulmonary bypass support or intra aortic balloon pump postoperatively. The chest was closed in the routine manner. There were no special requirements postoperatively apart from

low dose of intravenous nitroglycerine for the first 24 hours. All preoperative medications were restarted on the following postoperative day. The patients had repeated invasive and non-invasive assessments or investigations at 1 month, 4 month and 12-month postoperative period. This included coronary angiogram with left ventriculography, SPECT scan, 2-Dimensional echocardiography, 24-hour holter and tumour markers.

### Statistics

Results are reported as the mean value  $\pm$  standard deviation. Comparison of the changes from baseline to 12 months in these patients was assessed with Friedman test. A probability value  $<0.05$  was considered statistically significant. Statistical analysis was done with SPSS version 12.0 for windows.

### Results

All four patients enrolled were male. The median age was 59.3 years (range from 58 to 60 years old). The bone marrow aspiration went uneventfully and the intramyocardial implantation was completed successfully without any complication. Two patients had resternotomies for previous coronary artery bypass graft surgery, one had lateral thoracotomy and one other median sternotomy. Transesophageal echocardiography was used routinely during the intramyocardial injections to exclude accidental systemic embolisation, in which there was none. The patients were restarted on their preoperative medication but antianginal medication was withdrawn at 1 month follow-up. All except one patient completed the 12-month assessment postoperatively. There was no death, myocardial infarctions or cerebrovascular accidents during the procedure or at our follow up median of 14.3 months (ranges from 10 to 22 months). Periodic holter study showed no arrhythmias. Patients' symptoms improved as early as 1 month postoperatively and continued to do so at their last follow up. The New York Heart Association (NYHA) functional class improved from a mean of 3.2 preoperatively to a mean of 1.5 and 1.0 at 1 and



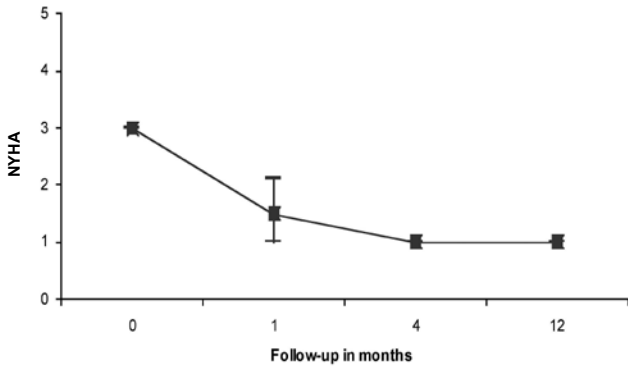


Figure 1. The NYHA functional classification from preoperative to postoperative period at follow up (p=0.041)

4 month follow up (Figure 1). This showed statistical significance with p=0.041. The Canadian Classification Score (CCS) for angina also showed a statistically significant change (p=0.049) with improvement from 2.3 preoperatively to 0 at 4 month postoperatively (Figure 2). The two dimensional echocardiography

**R & D and Human Development**

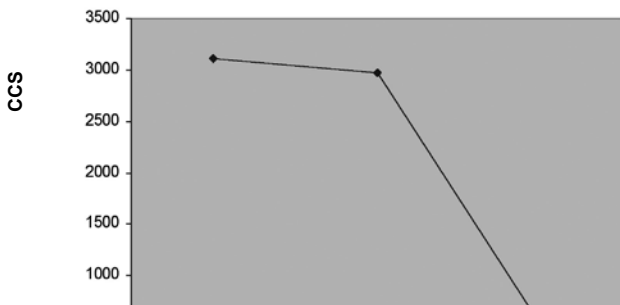
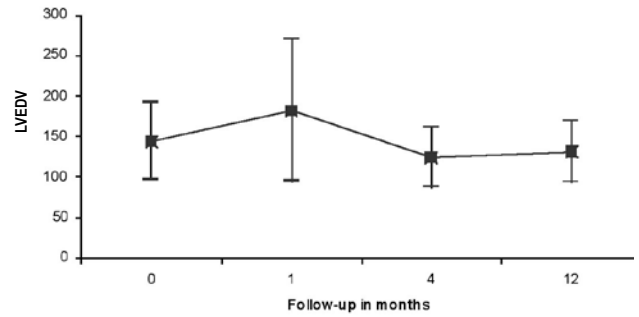
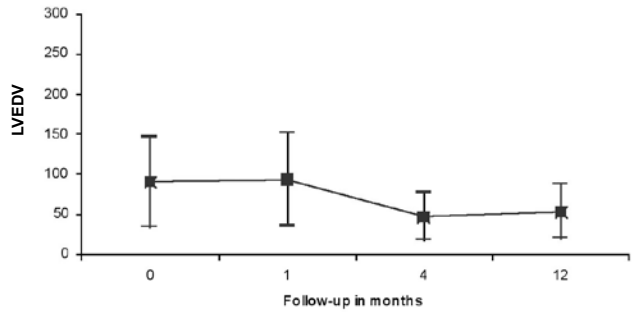


Figure 2. The CCS scoring at preoperative and postoperative follow up (p=0.049)

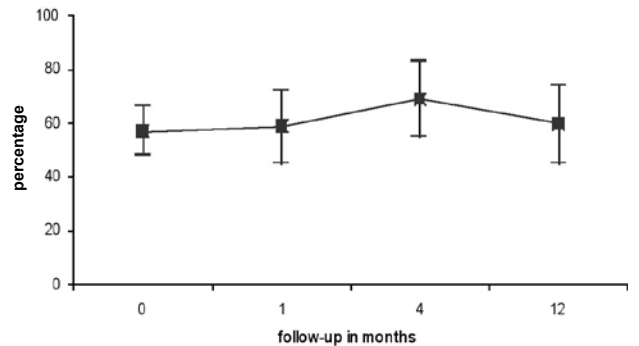
revealed an upward trend in left ventricular ejection fraction from 50±9% preoperatively to 58±14% at 12 months (p=0.117). Results from LV angiography (LVEF, LVESV and LVEDV) at baseline and at 1, 4 and 12-month follow up showed improvement but statistical significance was not reached (Figure 3). The areas of defect and reversibility from the technetium scan illustrated improvement but again did not show statistical significance (Figure 4). Most importantly all the patients managed to be independent and able to go back to work.



a. Left ventricular end-diastolic volume (LVEDV), p=0.457

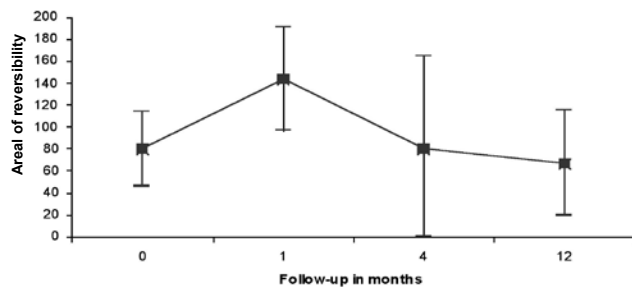


b. Left ventricular end-systolic volume (LVESV), p=0.199

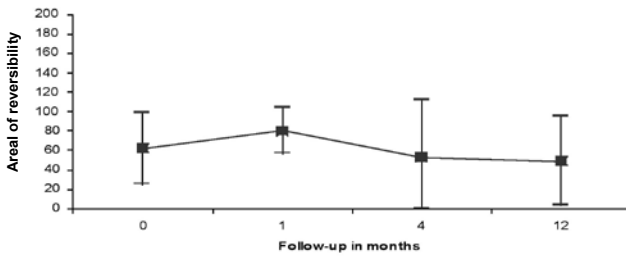


c. Left ventricular ejection fraction (LVEF), p=0.444

Figure 3. Left ventriculography at preoperative and at follow up

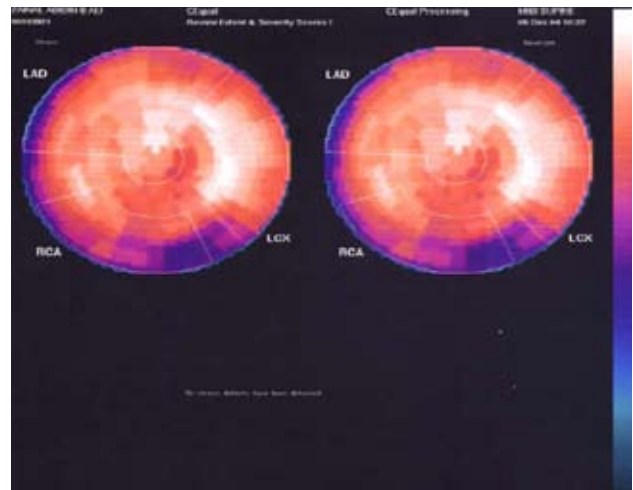


a. Areas of defect (p=0.334)

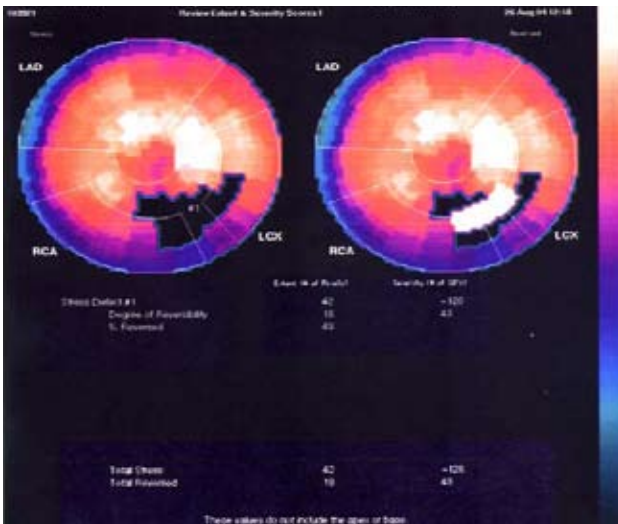


b. Areas of reversibility (p=0.615)

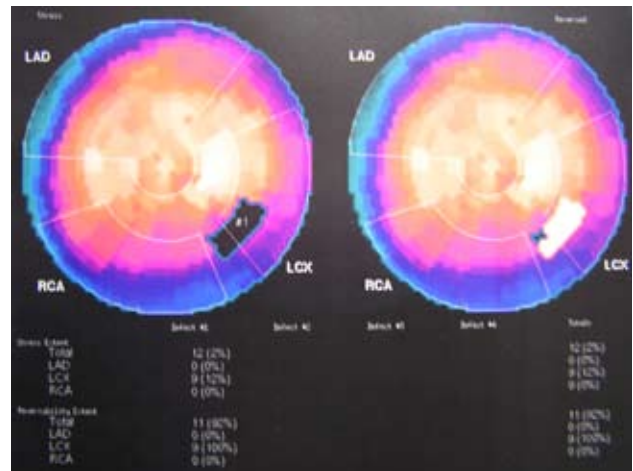
Figure 4. SPECT scan results from preoperative to postoperative period.



4 month SPECT scan

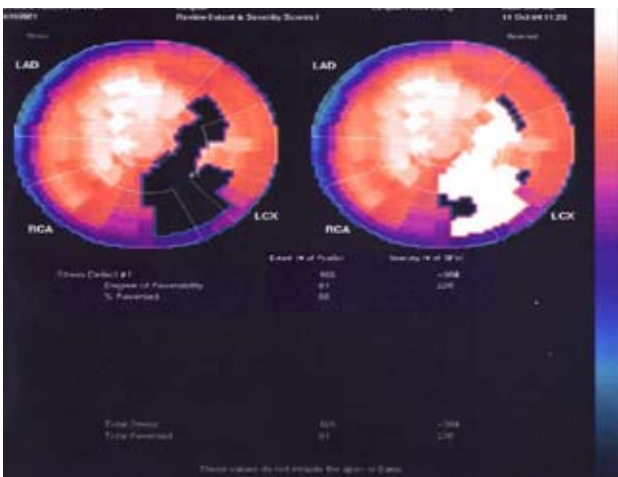


Preoperative SPECT scan



At 12 month SPECT scan

Figure 5. SPECT scan showing improvement in areas of defect (black area) and reversibility (white area)



At 1 month SPECT scan

### Discussion

The present report describes the first clinical trial of direct intramyocardial injections using high cell count of autologous bone marrow stem cell with a mean of  $2.4 \times 10^8$  cells as a sole therapy for patients who have severe ischemic heart disease whom are not suitable for normal revascularization methods. The number of patients are small because of the strict criteria used in patients selection. This is also compounded by the aggressiveness of most interventional cardiologist in treating triple vessel disease with percutaneous intervention and the improvement of surgical techniques in coronary bypass surgery. Nevertheless our results

showed that the intramyocardial injections using high cell count of autologous bone marrow stem cell procedure is relatively safe. There was no death or cerebrovascular events during the implantation or during the follow up period. All the mononuclear cells from the bone marrow aspirate were used as a whole, rather than subpopulation as each fraction of the bone marrow cells might contribute to the regeneration of ischemic myocardium. There were no recorded arrhythmias with the 24 hour holter during the follow-up period. There was significant improvement in symptoms of angina and effort tolerance as early as 1 month as shown in Figures 1 and 2. Although this highly subjective, this is supported by the transthoracic echocardiography which showed improvement in left ventricular ejection fraction from  $50\pm 9\%$  preoperatively to  $57\pm 10\%$  at 4 month and complimented with improvement in left ventriculogram ejection fraction from  $61\pm 6\%$  preoperatively to  $69\pm 17\%$  at 4 months. The analysis of the areas of defect and reversibility demonstrated some very interesting findings (Figures 3, 4 and 5). We had expected the direct trauma caused by the intramyocardial injections and thus predicted a time interval taken for angiogenesis and regeneration to occur, might make the areas of defect and reversibility to increase before any improvement was to be expected. This is clearly shown from the Figures 4 and 5 where the areas of defect and reversibility were increased at 1 month but subsequently decreased during follow-up period. These results demonstrate that the injection of high cell count of autologous bone marrow stem cells may lead to angiogenesis and repair of the ischemic myocardium although the objective measurements do not reached values of statistical significance due to the small number of patients. It also showed that the simple approach of direct intramyocardial injection into areas of interest as determined by the preoperative SPECT scan is feasible.

The evidence that cardiac cells may regenerate and the presence of cardiac stem cells stimulated an exciting journey and opportunities for myocardial repair [12-15]. This lead to the idea that the heart may be a terminally differentiated organ but does not composed

wholly of terminally differentiated cells. Recent clinical trials using autologous bone marrow stem cells in infarcted hearts have shown functional improvements [4-11]. Other clinical trials with the use of skeletal myoblast transplantation were equally encouraging [16,17]. The postmortem findings in some of these patients proved that engraftment and transdifferentiation may have occurred in both methods [18,19] However both methods of cellular therapy trials were done concomitantly with coronary artery bypass graft surgery or following angioplasties. Our study records two new approaches that differ from previous trials. Primarily we used a high cell count of autologous bone marrow stem cells, and secondly we performed this procedure as a sole therapeutic modality. Our preliminary findings showed that it is relatively safe and very encouraging early results were obtained. It is however must be reiterated that this therapy is not intended to be a first- or second-line therapy. This study aimed to find an alternative therapy that is reserved for those who are symptomatic despite on maximum medical therapy and are not suitable for any means of revascularisation methods. Therefore larger prospective randomized trials are required before such novel therapies could routinely be implemented. Hopefully we would know then which cells to use, how much to use and the best method of delivery for such cells .

### Acknowledgement

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## Cystosarcoma Phylloides: 20 years experience

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### Abstract

Cystosarcoma phylloides (CSP) is a rare tumour of the breast whose clinical behaviour does not correlate well with its histological findings. The optimal treatment of this tumour remains controversial. A retrospective study on the treatment and outcome of women diagnosed with CSP in Brunei between 1986 and 2005 was undertaken. Sixty-one women were diagnosed over the 20-year study period. Follow-up was complete in 59 cases. The mean age at diagnosis was 35 years. There were 38 (65%) histologically benign lesions, 12 (20%) borderline lesions and 9 (15%) malignant lesions. The mean follow-up period was 72 months. Eight patients (14%) had recurrences after initial operative treatment (in 5 benign, 1 borderline and 2 malignant lesions). Mean time to recurrence was 6 months. Breast-conserving surgery with adequate resection margin is advocated in benign and borderline lesions. For malignant lesions, simple mastectomy without routine axillary dissection is recommended. More research is required to determine the role of adjuvant chemotherapy and radiotherapy in the management of malignant CSP.

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### Introduction

Cystosarcoma phylloides (CSP) was first named and described by Johannes Muller in 1838, based on the gross pathological description of a 'bulky, cystic, fleshy and leafy tumour of the breast' [1]. Classically, the name CSP was applied because of the tumour's fleshy appearance and tendency to contain macroscopic cysts. Phylloides tumor is another proposed nomenclature. The term CSP however, is a misnomer as these tumours are usually benign. Cystosarcoma phylloides is characterised by the presence of both stromal and epithelial components. It is rare with an incidence estimated to be 0.3% to 0.5% of all breast tumours [2-3]

Several classifications of CSP have been proposed based on certain histopathological criteria (Treves and Sunderland [4], Pietruszka and Barnes [5], Azzopardi [6] and World Health Organization classifications [7]). These criteria consist of cellular atypia, stromal cellularity, sarcomatous

differentiation and mitotic index. The WHO classification was proposed in 1982 in order to promote uniformity in the recording and reporting of breast diseases and to facilitate international comparisons. Numerous reports have attempted to correlate the histological features with clinical outcome. These reports generally showed a poor correlation between the two and histopathology does not necessarily predict the clinical course [8-9]. As a result, the incidence of malignant CSP has been variably quoted to be between 3% and 54% [3].

CSP has presented a diagnostic and treatment dilemma for surgeons since its original description. Over the years, there has been debate regarding the optimal management of this tumour and clinical management still remains controversial. This report was undertaken to review our experience with CSP and to attempt to provide a practical approach to these rare and unpredictable breast tumours.

### Materials and methods

Cases indexed CSP or phylloides tumours between 1986 and 2005 (20 years) inclusive were obtained from the Department of Pathology. Cases diagnosed as pure sarcomas

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or giant fibroadenomas of the breast were excluded from the study. The records were retrieved and the cases were reviewed retrospectively. Histopathological material from each case was reviewed by one of the authors (Telesinghe). The WHO Classification of CSP was used and the lesions were categorised as benign, borderline or malignant based on the frequency of mitoses, infiltrative margins, cellular atypia and cellularity [7]. Data was obtained with regard to age, presentation, histological diagnosis, treatment, recurrence and follow-up.

## Results

There were 61 patients diagnosed with CSP in Brunei during the 20-year study period. Clinical details and follow-up were complete for 59 cases; one benign CSP case was lost to follow-up and another malignant case sought further management overseas. All of the patients were female. There were 38 (65%) histologically benign lesions, 12 (20%) borderline lesions and 9 (15%) malignant lesions. The mean follow-up period was 72 months (range 1-240 months).

The mean age at the time of diagnosis was 35 years (range 11-64 years). The mean ages of patients with histologically benign, borderline and malignant lesions were 30, 37 and 47 years respectively. All patients presented with a palpable breast lump and 11 cases (19%) also had associated pain. The mean duration of symptoms was 6 months (range 1-36 months). There appeared to be a predominance of left-sided lesions. There were 37 (63%) left-sided lesions and 22 (37%) right-sided lesions. The

mean size of the presenting breast lump was 6cm (range 1-25cm). The mean size of malignant lesions was larger (9cm) than benign and borderline lesions (both 5cm). Postmenopausal women consisted of only 4 cases (7%).

Six patients had breast ultrasonography as a pre-operative diagnostic modality; 3 were misdiagnosed as fibroadenomas, 1 was reported as 'a complex mass' and only 2 were correctly diagnosed as CSP. Nine patients underwent mammography with only 1 case correctly diagnosed as CSP and others misdiagnosed as fibroadenomas. Fine needle aspiration (FNA) of the breast lump was performed in 19 cases. The results were diagnostic in only 10 cases; 6 cases were misdiagnosed as fibroadenomas, 1 fibrocystic disease, 1 was reported as 'a malignant lesion' and 1 had no cellular yield. One patient underwent a core biopsy of the breast lump which was correctly diagnosed as a malignant CSP.

Primary treatment in this series included excisional biopsy in 31 cases, wide local excision (WLE) in 19 cases and mastectomy in 9 cases. All the 38 patients with benign CSP underwent either excisional biopsy or WLE only. WLE was used in 11 borderline lesions and in 1 of the 9 malignant lesions. Two patients in the borderline group had an intra-operative frozen section examination of the excised lump and subsequently had WLE under the same anaesthesia when the diagnoses revealed borderline lesions. One borderline lesion and 8 malignant lesions had mastectomy as the primary treatment (Table. 1).

	Excisional biopsy	Wide local excision	Mastectomy
Benign	31	7	
Borderline		11	1
Malignant		1	8

Table 1. Primary operations in the treatment of Cystosarcoma phylloides

Eight (14%) tumour recurrences were noted in the present study. Tumours recurred in 5 benign (17%), 1 borderline (8%) and 2 malignant (22%) cases. The time to recurrence ranged from 2 to 24 months (with a mean of 6 months); with recurrences occurring within 3 months in malignant lesions. In contrast, the time to tumour recurrence in benign lesions ranged from 6 to 24 months after the initial surgery. One benign lesion that recurred was initially treated by excisional biopsy and the original histopathology revealed involved resection margins. This patient subsequently underwent WLE. Recurrence occurred in 1 borderline lesion 14 months after the initial WLE. Mastectomy was performed for the recurrent tumour and the patient remained disease free at 91-month follow-up. One malignant lesion initially treated by mastectomy developed local recurrence after 2 months. Histopathology of the lesion showed a necrotic tumour with hypercellular stroma and marked mitotic activity. Despite excision of the recurrent tumour followed by chemotherapy, the patient died 10 months later with liver and brain metastases. The other malignant lesion had a WLE as the primary treatment in another country; she developed local recurrence 3 months later. This patient subsequently underwent a mastectomy. She remained disease-free 95 months later and had received no chemotherapy.

Axillary lymph nodes were sampled in 5 of the 8 patients in whom mastectomy was performed, as part of the primary treatment. None showed evidence of metastases. Similarly, no lymph node involvement was seen in the patient who underwent mastectomy for recurrent disease. Two of the patients with malignant CSP received adjuvant radiotherapy and chemotherapy after mastectomy because one histopathology of the lesion showed a highly cellular and vascular stroma and another showed marked mitotic activity. Both patients remained disease-free at 100 and 114 months follow-up respectively.

## Discussion

Cystosarcoma phylloides is an unusual neoplasm of the breast that demonstrates all the extremes of biological activity. It continues to present problems to both histopathologists and surgeons alike because of its atypical

and unpredictable behaviour. 'Benign' lesions have been noted to metastasise, and can recur locally [10]. In one study, local recurrence was seen to occur in 5% of benign tumours, 45% of borderline tumours and 37% of malignant tumours [11]. Another study noted more recurrence with benign lesions [12], whereas others noted no difference in recurrence rates between benign and malignant lesions [13]. Overall recurrence in the current series was 14% and this was compatible to that reported by Bennett *et al* (16.5%) [13] and Holthouse *et al* (15.4%) [14]. Metastasis in this series was 1.7%, which was much lower than the reported frequency of metastases in the literature (10% - 30%) [12, 15].

The difficulty of predicting the clinical behaviour of CSP is well known. Norris and Taylor [9] were among the first to use histopathological features in an attempt to predict prognosis, but highlighted the fact that no single feature was reliable. Further studies have found certain pathological criteria to be useful in predicting the tumours that are likely to behave in a malignant fashion. These include stromal overgrowth, nuclear pleomorphism, high mitotic rate and infiltrating margins [16]. Other studies have also reported the significance of the presence of necrosis and increased vascularity within the tumour [17]. In general, malignant lesions tend to be larger than benign ones, as noted in the present series; it is however, well recognised that even small lesions may behave in an aggressive manner and conversely large lesions may be benign.

Cystosarcoma phylloides has been described as occurring in patients with a wide range of ages from prepubertal to elderly [18]. The youngest patient in our series was 11 years old. The mean age of patients in this series is 35 years, which is younger than that noted in most series (in their 40's) [11, 13, 15]. This observation was also reported by Chua *et al* [19] and Iau *et al* [20] whose patients consisted of non-caucasian populations similar to ours. The mean age of patients with malignant lesions is generally reported to be greater than that for those with benign lesions and this was observed in this study. Malignant lesions also exhibited a tendency to recur early; both malignant recurrences in the present series recurred within 3 months of the initial surgery.



Classically, patients with CSP present with a firm, mobile, well-defined, round, lobulated and painless mass. The tumor can be extremely difficult to differentiate from fibroadenoma on physical clinical examination. In the series reported by Chua *et al.*, 71% of patients with a postoperative diagnosis of CSP had a presumptive preoperative diagnosis of fibroadenoma [19]. Another series showed a preoperative diagnosis of CSP in only 10-20% of patients [21].

A variety of techniques have been utilized to improve the pre-operative diagnosis of CSP. Cole-Beuglet *et al.* [22] performed a retrospective study on 8 cases of histologically proven CSP that were evaluated by mammography and ultrasound scan. They showed that while ultrasound findings (low-level internal echoes, smooth walls and smooth-margined fluid-filled clefts in a predominantly solid mass) may suggest a CSP, there is no consistent and reliable way to distinguish between CSP and other benign appearing tumors on ultrasound scan [22]. Mammographic diagnosis was unreliable since many of the lesions do not have typical mammographic malignant characteristics [14, 23]. Fine needle aspiration (FNA) cytology has not been shown to be of value, as seen in this and other studies [14, 21], primarily because of the difficulty in obtaining adequate numbers of stromal cells for cytogenic analysis [24]. Salvadori *et al.* found the FNA to be diagnostic in only 4 of 30 cases [11]. Core tissue biopsy is an attractive alternative to FNA, and several authors have suggested its use as a preliminary procedure [25-26]. Core tissue biopsy may represent a preferred means of preoperative diagnosis for giant breast tumors, and the histological information gained is important in guiding surgical treatment.

Certain guidelines on the surgical treatment of CPS have been proposed [27] but the optimal management of patients with CSP remains controversial. A high index of suspicion is therefore, required for the initial diagnosis of CSP. In general, these tumours are large, palpable and painless on presentation. Skin fixation, ulceration and nipple changes are rare. A rapid growth is often noted. It tends to present in younger patients than carcinoma of the breast [4-5].

Surgery remains the primary treatment. The aim is to excise the lesion with adequate margins to prevent local recurrence, including mastectomy if required. This is advocated for benign lesions. It is felt that local recurrence is due to inadequate local excision; as seen in one of the recurrences in benign lesion in the present series. If the lesion is found to be malignant, a simple mastectomy is recommended at that time. Malignant CSP, unlike carcinoma, is generally not responsive to radiotherapy or chemotherapy and simple mastectomy is the best procedure to prevent local recurrence. Routine axillary lymph node dissection is not generally performed because of low yield, as this disease rarely spreads by lymphatics [9, 15]. No positive nodes were seen in this series in which axillary dissections were performed. For borderline lesions, the optimal primary treatment is more controversial. Breast-conserving surgery with WLE was employed as the primary treatment in the present series. As seen in other series [14-16], this primary treatment for borderline lesions seemed to be adequate. However, when a borderline lesion recurs after primary surgery, a simple mastectomy may be required. This more radical treatment may be justifiable as most reports have shown that recurrent tumours tend to be more aggressive with a higher mitotic count and greater degree of nuclear pleomorphism than the original lesions [13, 28].

Although no conclusive evidence supports adjuvant radiotherapy or chemotherapy for malignant CSP, encouraging results using radiotherapy and chemotherapy for soft tissue sarcomas suggest consideration be given for its use with malignant CSP [29]. Effective radiotherapy and chemotherapy have also been reported in isolated cases. Radiotherapy was shown to lead to a slow regression of CSP [2, 30] and Chaney *et al* [31] had found adjuvant radiotherapy to be beneficial in 8 patients whose CSP showed adverse features (bulky tumours, positive margins, recurrence and malignant histology). Effective chemotherapy in 4 patients using ifosfamide alone or in combination with doxorubicin was reported by Hawkin *et al* [32]. We have also used ifosfamide in combination with doxorubicin in 2 of our malignant CSP who had poor prognostic histopathological features. Both patients were alive and disease-free at 100 and 114 months follow-up.

Others have also reported effective chemotherapy with cisplatin and etoposide [33]. The use of tamoxifen in CSP has not been fully investigated. However, oestrogen and progesterone receptors were found to be present in these tumours [34] and future studies with hormonal manipulation in CSP may be warranted.

Local recurrence rates for CSP are 15-20% and are correlated with positive excision margins, rather than with tumor grade or size [19, 21, 27]. Other studies have shown a higher risk of local recurrence in borderline and malignant tumors. In a series by Salvadori *et al.*, 51 patients were treated with breast conserving surgery (enucleations, wide local excisions), and 14 of the tumors recurred locally. In contrast the 20 patients treated with mastectomy (subcutaneous, modified radical, or radical) showed no evidence of local recurrence [11].

Cystosarcoma phylloides do not typically metastasize via the lymphatics. About 20% of patients have palpable axillary lymph nodes on presentation, but only 5% of these show histological evidence of metastasis on pathological examination. Of the CSP with a malignant histology, up to 15% will metastasize to the axilla [2]. Kessinger *et al.* found that all metastatic lesions described in the literature contained only the stromal elements [2]. No malignant epithelial elements were observed. Since most sarcomas metastasise haematogenously, this finding may explain why axillary metastasis is so rare. Palpable lymphadenopathy is typically attributed to the patient's immune response to tumor necrosis. The rare patient who does have lymph node metastases tends to have a poor prognosis [35]. Because of the rarity of lymph node involvement, most authors advocate that the removal of axillary lymph nodes is not warranted unless there are palpable nodes [17, 27, 31]. Metastasis is reportedly seen only in 4% of all CSP [11]. The most common sites for metastasis include the lungs, bone, liver and distant lymph nodes, and skin involvement does not appear to be a predictor of metastasis [36].

Reinfuss *et al.*, using the histopathological criteria developed by Azzoperti and Salvadori *et al.*, reported a 5-year survival of 95.7% for benign tumors, 73.7% for borderline tumors, and 66.1% for malignant tumors [37].

A study by Chaney *et al.*, which combined the benign and borderline tumors into a single category, found 5-year survival rates of 91 % for benign tumors and 82% for malignant tumors [31]. Ten-year survival rates, however, dropped to 79% and 42%, respectively [31].

## Conclusions

Cystosarcoma phylloides is a rare breast tumour that often shows behaviour that is different and unpredictable from histopathological findings. Its management presents the surgeon with unique challenges. Surgery remains the main primary treatment and an adequate resection margin must be obtained in all cases. In benign and borderline lesions, breast-conserving surgery should be employed, except when tumour size prohibits. For malignant lesions, simple mastectomy without routine axillary dissection is recommended. Anecdotal cases have shown that adjuvant radiotherapy and chemotherapy may be beneficial in CSP with poor prognostic histological features (hypercellular stroma, high nuclear pleomorphism, high mitotic rate, infiltrating margins, the presence of necrosis and increased vascularity within the tumour). However, further research is required to determine the role of radiotherapy and chemotherapy in the management of CSP. In all cases of CSP careful long-term follow-up is recommended.

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## Dental management of patients prior to cardiac surgery

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### Abstract

A retrospective analysis of cases treated at the Dental department after referral from the Gleneagles Jerudong Park Medical Center (GJPMC) prior to cardiac surgery. The cases were divided into high risk, moderate risk and low risk based on antibiotic administration and analyzed. They were also divided based on patients with bleeding disorder or without bleeding disorder based on drugs which modified the hemodynamics of blood flow. On an average it took a week to render the patient orally fit for cardiac surgery with minor dental procedures such as extractions, where as it took two weeks on an average for patients who required major dental procedures such as removal of impacted molars or cyst removals. This data helped us to formulate a time period prior to dental fitness for cardiac patients prior to cardiac surgery.

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### Introduction

All patients undergoing open heart surgery, especially prosthetic valve replacement, are routinely screened for oral foci of infection and have to be rendered orally fit prior to cardiac surgical intervention [1]. On average 4 patients a month were referred from GJPMC for dental fitness prior to cardiac surgery from January 2005 to December 2005. Oral fitness is important because studies have implicated as increased risk in cardiovascular disease and other systemic diseases [1]. Dental infections fall into 3 general categories: localized (e.g., acute periodontal abscess, peri-implantitis), spreading (e.g., early cellulitis, deep space infection), and life-threatening (e.g., fasciitis, Ludwig's angina). The most common dental infections include dental caries, dentoalveolar infections (pulpal infections and periapical abscess), periodontal disease (including pericoronitis and peri-implantitis). If left untreated, dental infections can spread systemically and contribute to polymicrobial infections at other sites, including the sinuses, the sublingual space, palate, central nervous system, pericardium, and lungs. Dental disease [caries and periodontal] has been implicated in systemic disease such

as diabetes, cardiovascular, osteoporosis and spontaneous preterm birth [3]. Many risk factors have been studied for periodontal disease out of which clear risk factors were dental plaque and frequency of dental visits; other risk factors are presence of plaque with *Porphyromonas gingivalis* and *Bacteroides forsythus*, male gender, age, diabetes, and smoking. Stress, osteoporosis, and genetics also have been studied as risk indicators for periodontal disease [4]. The risk factors for cardiac diseases and periodontal diseases seem to overlap.

### Materials and methods

Seventeen patients referred to RIPAS dental department for dental clearance from GJPMC in 2005 that were incorporated in the study. Thirteen patients were male and 4 were females. Their ages ranged from 42 to 74 years. These patients were categorized based on risk assessment using British Cardiac Society guidelines for endocarditis prophylaxis 2003 [5]. Data were analyzed based on type of treatment rendered, period of stay in hospital, number of patient admitted in the hospital prior to or during the treatment, and the time taken to certify them orally fit.

### Results

The study had 4 patient in the high risk group, 13 patients in the moderate risk group and nil in low risk group. Twelve patients had bleeding tendencies out of which

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2 were on Heparin, 7 on Warfarin, 2 on Asprin alone, 7 on aspirin and warfarin and 1 on heparin and aspirin. All patients required scaling, emphasis on oral hygiene and oral hygiene instructions. 9 (52%) patients required multiple teeth extraction, 2 patient required single tooth removals. One patient required surgical lower third molar removal. 1 patient required surgical removal of dental cyst. Seven (41%) patients required dental fillings. Eight (45%) patients were admitted in the hospital during treatment. Two patients had to stay more than 2 days whereas others were discharged from dental within 2 days. The entire high

risk group patient was admitted in the hospital for dental treatment. All patients who required extraction and are taking warfarin or heparin were hospitalized. The average time taken for dental fitness was an around a week. Eleven (64%) patients were rendered dentally fit in a week's time. Three (17%) patients were certified fit on the same day, 2 patients required more than 2 weeks due there medical condition and dental status. One patient required more than 1month for dental fitness due to a dental cyst which required removal.

Figure 1. Types of medications taken by patients which alters there hemodynamics of blood flow

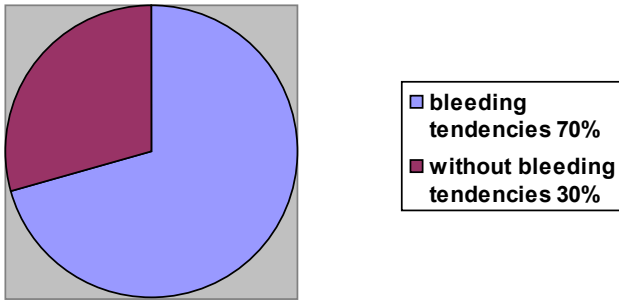


Figure 2. Percentage of patients with bleeding tendencies

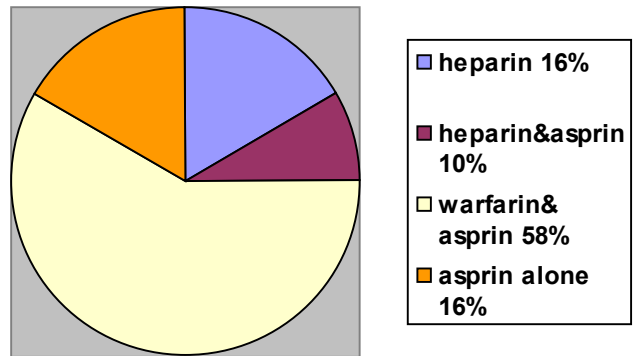


Figure 3. Treatments rendered to the patients

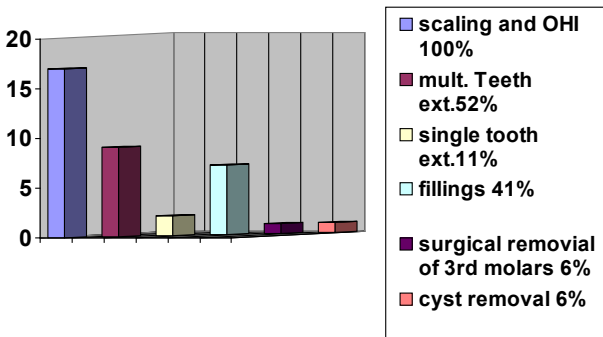
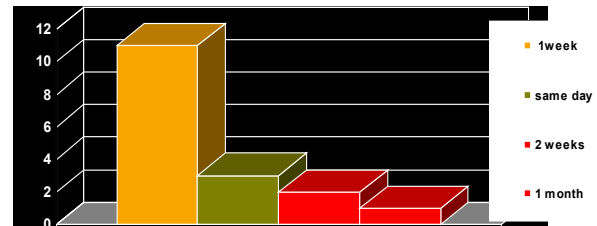


Figure 4. Time taken to achieve dental fitness in the patients



**Discussion**

With increased life expectancy along with better dental care causes greater concern to be focused on long term maintainance of teeth by cardiac patients. Two main concerns for cardiac patients are bleeding tendencies in these patients and future maintenance of dental health. The

main problem faced by dental surgery is bleeding tendency which is mostly caused by anti-coagulants (oral Warfarin) or anti-platelet drugs (Asprin). Traditional management entails the interrupting these drugs prior to dental surgery procedures based on laboratory investigation (INR greater than 3.5for Warfarin) to prevent hemorrhage [6]. This practice may increase the risk of potential life threatening

thromboembolism, the issue is still controversial [7]. The management of oral surgery procedures patients with anticoagulants should be influenced by several factors; extent and urgency of surgery, treatment rendered to the patients laboratory values, treating physicians recommendation, available facilities, dentist expertise and patients oral medical and general conditions [8]. During the past decade, several studies of the relationship between cardiovascular disease and dental diseases have been reported. Case control studies have shown that the higher the caries index the greater the association with heart disease [9]. De Stefino showed that there was relationship between baseline periodontal disease and the subsequent development of heart disease in men younger than 50years [10]. Normative aging study showed increase in stroke by 2.5 times in those patients who had periodontal diseases. In addition this study showed a graded response between baseline bone loss and risk of developing heart disease, people with 60% bone loss had 30% to 40% increase risk of developing heart disease in the next 15 years. Native American on Gila River Indian Reservation were studied because of their low levels of smoking, (only 5% of the population smoked and these smoked only few cigarettes per day). Among 1440 natives studied, a very strong relationship between periodontal diseases and cardiovascular diseases was observed [11].

In our study we found out that most of our patients required dental treatment prior to cardiac surgery. We have discussed about dental disease and cardiovascular disease to emphasize the importance of dental care in these patients. It is not only important to render these patient dentally fit but to motivate them to maintain good oral hygiene and regular dental visits. Our study showed it took on an average about a week to certify them dentally fit which implies that it postpones a major cardiac surgery by a week. Based on evidence it is mandatory to maintain oral hygiene by all and more so by cardiac patients to reduce the risk of cardiovascular complications.

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# Anterior cruciate ligament rehabilitation programme following anterior cruciate ligament reconstructive surgery: a pilot study

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## Abstract

Rehabilitation following reconstruction of the anterior cruciate ligament (ACL) has changed dramatically over the past few decades. This includes leg immobilization for 12 weeks post-operation and the use of crutches for 16 weeks. These protocols have been developed because of the idea that intra-articular recovery is a long-term process. However, it is now well understood that as immobilization time increases, intra-articular ligament strength decreases. With increased scientific knowledge, current rehabilitation has begun to incorporate immediate post-operative range of motion as well as muscle power and strength, proprioceptive and control training. A specific ACL rehabilitation protocol was developed in January 2004, targeting patients with post-operative ACL reconstruction in RIPAS Hospital. Prior to this, there were no specific rehabilitation programmes adopted for these patients. A six-month ACL rehabilitation programme was developed based on three outstanding protocols adopted within the South East Asian region. The programme began with an initial intensive 10 week period, and emphasised mobility, strength, proprioception, control, plyometrics, agility, endurance and sport specific activities. Thirty-four out of 56 patients (61%) managed to complete the rehabilitation programme with 31 being able to return back to normal activities within six months. Twenty-two patients (39%) did not complete the programme, mostly owing to non-attendance or transfers to other centres. The ACL rehabilitation programme developed by the Physiotherapy Department of RIPAS Hospital managed to fulfil and cater the rehabilitative needs of patients following ACL reconstructive surgery in order to get them back to satisfying levels of activity.

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## Introduction

With the ever-increasing awareness on the importance of sport and physical activities for health and general well-being, more and more people are moving and involving themselves into the world of sport. Concomitant with this, there has been an increase in sports-related injuries, particularly to the lower limbs. Specifically, ligamentous injuries to the knee, rupture of the anterior cruciate ligament (ACL) has been the commonest [1-3], and has the greatest potential to cause both short term and long term disability [4].

The ACL is a broad ligament inside the knee joint, joining the anterior tibial plateau to the posterior femoral intercondylar notch. The tibial attachment is to a facet, in front of, and lateral to the anterior tibial spine. The femoral attachment is high on the posterior aspect of the lateral wall of the intercondylar notch [4,5]. The biomechanical function of the ACL is complex for it provides both mechanical stability and proprioceptive feedback to the knee [6,7]. The most common cause of ACL rupture is a traumatic force being applied to the knee in a twisting moment [8,9]. This can occur with either a direct or an indirect force. Haim *et al.* reported that about 70% of ACL injuries do not result from direct contact i.e., while side-stepping, pivoting or landing from a jump [10].

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Once the diagnosis of ruptured ACL is made, management can be divided into conservative and surgical. According to Cross [4], correct choice of treatment depends on assessment of factors such as age, functional disability



and functional requirements. If surgery is indicated, ACL reconstruction is the standard surgery, however, a wide variety of reconstruction procedures is available and a standard procedure has not been defined. In Brunei Darussalam, arthroscopic reconstruction with a hamstring tendon graft is commonly adopted. Rehabilitation, on the other hand, starts post-operatively and continues until the patient is able to get back to normal levels of activity.

Rehabilitation following ACL reconstruction has changed dramatically over the past few decades. This includes leg immobilization for 12 weeks post-operation and the use of crutches for 16 weeks. These protocols were developed because of the idea that intra-articular recovery was a long-term process. However, it is now well understood that as immobilization time increases, intra-articular ligament strength decreases. With increased scientific knowledge, current rehabilitation began to incorporate immediate post-operative range of motion as well as muscle power and strength, proprioceptive and control training. Hence, the major goals of rehabilitation following ACL surgery are: restoration of joint anatomy; provision of static and dynamic stability; maintenance of the aerobic conditioning and psychological well being; early return to work and sport. These have required the development of an intensive rehabilitation programme in which the patient has to take an active involvement [4]. At present, there is no specific and standard rehabilitation protocol available in RIPAS hospital for patients following ACL reconstructive surgery. Patients referred for rehabilitation are seen by different physiotherapists and were prescribed varying types of exercises and modalities, thus resulting in different outcomes.

The main aim of this pilot study was to evaluate the effectiveness of a developed ACL rehabilitation programme on patients following ACL reconstructive surgery in RIPAS Hospital.

## **Methods**

### *Development and Standardization of Protocol*

An ACL rehabilitation programme was developed based on three outstanding protocols from different hospitals within the South East Asian region: Jerudong Park Medical Centre, Brunei Darussalam; Intan Gleneagles Medical

Centre, Malaysia; Singapore General Hospital. These three protocols were chosen because they are currently being used by physiotherapists in the physiotherapy department of RIPAS Hospital. The general outline of the developed programme encompasses the three above protocols. It was a six-month graduated programme with an initial intensive 10-12 week period emphasizing range of motion, strength, proprioception, control, plyometrics, agility, endurance and sport specific activities.

The developed rehabilitation programme was divided into phases. The first initial phase involved seeing the patient one or two days post-operatively when the patients were taught general lower limb exercises with emphasis on static contraction of both quadriceps and hamstrings muscles, and to continue after discharge from the ward. They were also taught non-weight-bearing mobilization with crutches, and a post-operative knee brace was supplied by the orthotist and prosthetist. The patient will be given physiotherapy outpatient appointments two to three times a week for the next 10 weeks.

On their first initial physiotherapy outpatient appointment, the patients were assessed in terms of knee range of motion, muscle power and functional status. Any pain and knee swelling was also addressed according to the usual physiotherapy modalities. During the first one to three weeks the aims of therapy were to decrease pain and swelling, and increase the range of motion of the knee. The Continuous Passive Motion (CPM) machine may have been used in the earlier phase mainly to increase knee flexion. Passive knee mobilization techniques were performed to reduce any flexion deformity. Quadriceps and hamstrings strengthening exercise programme were also be continued to prevent muscle atrophy. Most patients graduated from non-weight-bearing crutch-walking to partial weight-bearing. The post-operative brace used until there was adequate control of the quadriceps.

The second phase from three to ten weeks post-operatively, continued to emphasize increasing the range of motion, increasing weight-bearing and gaining hamstring and quadriceps control, gradually progressing to general muscle strengthening activities. Only closed chain

exercises were adopted in this programme. Proprioceptive work was introduced and progressed from static to dynamic techniques including balance exercises on the wobble board and eventually jogging on a mini-tramp. The patient should have had a full range of motion during this stage and gentle resistance work e.g. gym work could be added. By the end of this period the patient should have been able to walk with a normal gait pattern without any walking aid, and have good muscular and proprioceptive control. Progress was determined by the achievement of specific functional goals rather than by simple time frames. Hence, the phase maybe extended to twelve weeks depending on the patient's progress in terms of range of motion, muscle power, pain and swelling.

The fourth phase of rehabilitation from ten weeks to six months involved the gradual re-introduction of sports specific exercises aimed at improving agility and reaction times and increasing total leg strength. At the very start of this phase, patients were brought to the hydrotherapy pool, where they were taught patterns of jogging and swimming, paying particular attention to the knee stability. Once the patients were able to do this, only then were they allowed to try jogging and running on land. Patients were advised to continue their exercise regime and to take up gym work to build up on their muscle power and bulk. They were reviewed monthly until fit for discharge; usually six to nine months post surgery.

### *Patients*

A total of 56 patients (55 males and 1 female) who had had ACL reconstructive surgery between January 2004 and September 2005 were recruited. All these patients had their surgery performed by the orthopaedic surgeons in RIPAS Hospital using the hamstring tendon as the graft of choice and a closed loop endobutton fixation technique. Exclusion criteria included patients who had the surgery outside Brunei; presence of concomitant ligament damage e.g. posterior cruciate tear, collateral tears; patients who were put on cylinder cast or plaster of Paris for immobilization for some time following reconstructive surgery.

A return to normal activities in 6 months after reconstructive surgery, coupled with the following indicated a successful rehabilitation: full active knee range of movement; 85 - 90%, or more, muscle power compared to the unaffected side; no joint instability, with good proprioception and control.

## **Results**

The general outline of the developed programme is given in Table 1. Thirty-four out of the 56 patients (61%) taking part in this pilot study managed to complete the six-month programme. The other 22 patients (39%) did not complete the programme, mostly due to non-attendance or transfer to other centres.

Thirty-one out of the 34 patients (91%) that completed the programme were able to return back to normal activities in six months after their reconstructive surgery. The remaining three (9%) were able to return back to normal activities within nine months of surgery.

Table 1. ACL Rehabilitation Programme

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### **Prior to discharge**

#### *Home Exercise Programme*

Ankle Exercises

Heel Slides

Static Quadriceps/Hamstrings

Straight leg raise/vastus medialis oblique

None weight bearing mobilisation mobilisation

Knee brace

Advice

*(NB: Knee brace supplied and monitored by the orthopaedic team)*

### **0 - 3 weeks**

#### *Exercise Programme*

Straight leg raise/vastus medialis oblique

Theraband exercises

Ankle Weights exercises

Knee exercises in prone

Tiptoe exercises

Gentle stretches

*Passive mobilisation*

- Patellar mobilisation
- Ant-Post mobilisation

*Electrophysical Modalities*

- Cryotherapy
- Pulsed Ultrasound
- Pulsed short wave diathermy

None-weight bearing and partial-weight bearing mobilisation

*(N.B. Knee flexion range of motion should reach 100° before progressing to next phase)*

**3 - 10 weeks***Exercise Programme*

- Cycling
- Wobble board activities
- Trampoline activities
- Half-squats
- Hamstring exercises
- Lunges
- Steps exercises
- Stretches
- Gym Work

*Passive Mobilisation*

- Patellar mobilisation
- Ant-Post mobilisation

*Electrophysical Modalities*

- Cryotherapy
- Pulsed Ultrasound
- Pulsed short wave diathermy

Partial And Full-weight Bearing Mobilisation

*(NB: Time line can be extended up to 12 weeks according to patient's progress and development in terms of knee active range of motion, muscular power and strength, pain, swelling)*

**After 10 weeks***Hydrotherapy*

- Jogging
- Hopping
- Swimming
- Stretches
- Jogging/Patterns of Running
- Gym Work
- Sport-Specific Activities

**Discussion**

The result of this study shows that all recruited patients who managed to complete the programme were able to return to activities prior to injury, although three of them completed it within nine months, three months later than the targeted six months. This was attributed to a number of factors such as degenerative changes, severe muscle atrophy prior to surgery and low compliance to exercise regime. Some of the patients recruited for the programme also had partial meniscectomy performed together with ACL reconstruction. This may or may not have affected their rate of recovery during their rehabilitation phase.

Thirty-one of the 34 patients who completed the programme managed to return to normal activities in six months after their surgery. However, it is noted that, while conducting the study, that although the final outcome was more or less the same, there were variations in terms of patients' progress at certain stage of the rehabilitative phase. Hence it can be concluded that due to individual variation, it would not be prudent to develop specific protocols that detail each step of the rehabilitation programme following ACL reconstruction. It is possible, however, to establish guidelines for protocols that are based upon scientific research.

Factors determining the successful return to normal activities after surgery and intensive rehabilitation appeared to be too subjective. The use of reliable outcome measures before and after surgery and rehabilitation would benefit in concluding the effects of rehabilitation on symptomatic

and functional factors. Outcome measures such as the Lysholm Tegner Knee scale and the International Knee Documentation Committee Subjective Knee Form would offer the study a much more valid and reliable result [11,12].

It is concluded that many factors must be considered when designing a protocol for a given patient, as they will all have a role in the success or failure of the programme. These factors include conservative versus accelerated approach, surgical considerations such as graft type and source, sex differences, and perhaps most importantly the motivation of the athlete to return to competition. It should be noted that every patient is different, with different rehabilitative needs. Hence, designing a tailor-made ACL rehabilitative programme, based upon scientific research, for each individual patient will hopefully produce a better outcome. With a good understanding and knowledge-based on the need of proper rehabilitation, coupled with evidence-based practice, the ACL rehabilitation protocol developed by the Physiotherapy Department of RIPAS Hospital managed to fulfil and cater for the rehabilitative needs of patients with post-operative ACL reconstruction in order to return them to satisfying levels of activity. Nevertheless, this protocol should only be used as a guideline. Physiotherapists and clinicians alike should always be open and exposed to new ideas and ground breaking research and scientific studies in this area.

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# Utilization of general anaesthetic services by dental patients at RIPAS Hospital, Brunei

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## Abstract

In recent years, there has been an annual increase in the number of patients seeking dental surgical procedures under general anaesthesia in our hospital. This may be due to the convenience of day care surgery which was introduced in 2001 primarily for the management of children.

The aim of this study was to examine the utilization patterns of general anaesthetic services by dental patients at our hospital to help plan future manpower and service needs. For the purpose of this study, children were classified as those up to the age of 16 years.

A retrospective study of accurately maintained operating theatre lists was analyzed for a period of 12 months from January to December 2005. A total of 192 patients were treated under general anaesthesia during this period. The majority were males (55.2%). Malays were 92.7% and Chinese were 4.2%. Patients below 35 years of age comprised 93.8% and almost 50% of the patients were children less than 16 years old. Thirty per cent of the patients were below 5 years of age. Of the children, one third of them were medically compromised and one fifth of them were with special needs. Of the children, 88.3% came in for extractions of multiple decayed teeth. The majority of adults were hospitalized for the surgical removal of impacted wisdom teeth (77.6%).

This study documents the profile of patients seeking dental treatment under general anaesthesia at RIPAS Hospital and highlights the demand for extraction of multiple caries teeth and surgical removal of impacted wisdom teeth in the local population.

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## Introduction

Dental diseases especially dental caries (tooth decay) and periodontal disease (gum disease) continue to be a burden in many developing countries with inadequate dental manpower and poor preventive oral health programs. Brunei Darussalam is no exception. Though Brunei has met almost all the target health indicators set by the World Health Organization (WHO) such as the infant mortality rate, maternal mortality ratio and life expectancy, we have

unfortunately not been able to achieve the oral health goals set by the WHO for the year 2000.

Bruneians are still battling the ravages of dental caries which has been brought under control in many countries through effective programmes and strategies implemented over the past 20 to 30 years. Comparison of the oral health indicators with other countries in the region and several developed nations reveal that Brunei's oral health status is lagging far behind (Table 1).

Many Brunei children who are high-risk for dental caries require multiple extractions of unsalvageable teeth. Young adults who suffer from recurrent peri-coronal infections often require the removal of multiple wisdom teeth. Many of these patients are better managed under a general anaesthetic in order to render them orally fit.

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## DECAYED, MISSING, FILLED TEETH (DMFT) for 12-year-olds

Country	Per capita income 2004 US\$ / rank*	YEAR**	DMFT**
Hong Kong	\$34,200.00 (9)	2001	0.8
Australia	\$30,700.00 (17)	2000	0.8
United Kingdom	\$29,600.00 (19)	2000/1	0.9
Japan	\$29,400.00 (21)	1999	2.4
Sweden	\$28,400.00 (26)	2002	1.1
Singapore	\$27,800.00 (29)	2002	1.0
<b>Brunei (2003*)</b>	<b>\$23,600.00 (38)</b>	<b>1999</b>	<b>4.8</b>
Malaysia	\$ 9,700.00 (83)	1997	1.6
Thailand	\$ 8,100.00 (93)	2000/1	1.6
Philippines	\$ 5,000.00 (129)	1998	4.6
Indonesia	\$ 3,500.00 (149)	1995	2.2

Source: The World factbook\*  
WHO databank\*\*

In 2001, day care surgery was introduced primarily for the management of children under general anaesthesia (G.A.). Since then, there has been an annual increase in the number of patients seeking treatment under G.A.

The aim of this study was to examine the utilization patterns of general anaesthetic services by dental patients at our hospital to help plan future manpower and service needs.

### Materials and Methods

A retrospective analysis of accurately maintained operating theatre lists was analyzed for a period of 12 months from January to December 2005. The data collected included the patient's name, registration number, age, sex, race and procedure undertaken. For the purpose

of this study, children were classified as those up to the age of 16 years.

### Results

A total of 192 patients underwent procedures under G.A. during this period. The majority of them were males (55.2%) and there was an almost even distribution of children and adults. Of these 92.7% were Malays, 4.2% were Chinese, 1.5% of them were Caucasians and the remaining 1.5% comprised Dusuns, Nepalese and Indians (Table 2). Among the 94 children the majority were Malays (93.6%) followed by the Chinese (2.1%) (Table 3).

Table 2: Racial Distribution

Malays	178	92.7%
Chinese	8	4.2%
Caucasian	3	1.5%
Others*	3	1.5%

(\*Dusun, Nepalese, Indian)

Table 3. Racial Distribution of Children

Malays	88	93.6%
Chinese	2	2.1%
Caucasian	1	1.1%
Others	3	3.2%

(\*Dusun, Nepalese, Indian)

The age distribution ranged from 1+ years to 47 years. The majority, 93.8% of the patients were below 35 years of age. The majority of the patients (32.8%) were between the ages of 15 to 24. Only 1% of the studied sample was above 45 years of age (Table 4).

Almost 50% of the patients were children below 16 years. 30% of the patients were less than 5 years of age (Table 5)

Table 4. Age Distribution

0-4	44	22.9%
5-14	42	21.9%
15-24	63	32.8%
25-34	31	16.2%
35-44	10	5.2%
45-54	2	1.0%
>55	0	0%

Table 5: Age Distribution of Children and Adults

<5yrs	58 (30.0%)
0-16 yrs	94 (49.0%)
>16 yrs	98 (51.0%)

One third of the children were medically compromised and one fifth of them were children with special needs (Table 6).

Table 6. Medically Compromised Children (33%)

Autistic	5	Mute	1
Downs Syndrome	2	Pierre Robin Syndrome	1
Mentally retarded	4	Congenital Heart Disease	3
Slow learners	3	Diabetic	1
Cerebral Palsy	2	Asthmatic	5
Cleft Lip & Palate	2	G6PD Deficiency	2

88.3% of the children came in for multiple extractions of decayed teeth. Only 3.2% underwent restorative treatment under G.A.(Table 7). The majority of the adults (77.6%) were hospitalized for the surgical removal of impacted wisdom teeth and another 14.3% for extractions. (Table 8).

Table 7. Procedures in Children

Extractions	83
Surgical removal of unerupted teeth	3
Surgical removal of odontomes	2
Surgical removal of supernumeraries	1
Gingivectomy	1
Excision biopsy	1
Fissure sealing	1
Restorations	2

Table 8. Procedures in Adults

Surgical removal of wisdom teeth	77.6%
Extractions	14.3%
Others	8.1%

## Discussion

The demand for the management of dental patients under general anaesthesia or sedation will always be present immaterial of whether a country is developed or not. Between the years 1963 and 1973, the number of general dental anaesthetics administered within the aegis of the National Health Service Dental Estimates Board of the United Kingdom fell by 18 per cent while the number of treatment courses rose by 54 per cent. A similar trend can be detected in the available figures for the School Dental Service where the number of general anaesthetics fell by 32 per cent between 1960 and 1970 and the attendances rose by 14 per cent [1]. The decline in G.A. for dental outpatients was related in part to the unsatisfactory remuneration available from the Department of Health and Social Security. During 1976, a reliable estimate of the number of general dental anaesthetics administered to outpatients in the public and private sectors in England and Wales was in the region of 1.5 million [2]. Chanpong *et al* recently reported a significant need and demand for sedation and G.A. in the Canadian adult population [3].

Our study reveals that there were more males than females seeking treatment under general anaesthesia. This may be due to poorer oral health amongst the males. Malays were the majority of the patients. This could be a reflection of the composition of the population or a reflection of their poor oral health status as well. It could also reflect on their higher acceptance of general anaesthesia compared to the Chinese population.

There was an almost equal demand for management under general anaesthesia from both children and adults. Surprisingly, there were no patients above 55 years of age. This may be due to less dental intervention required in the older cohorts as reflected in Table 4. A good majority of the sample were below 35 years (93.8%) reflecting the burden of disease in the younger age groups. Almost half of the patients were in fact below 16 years i.e. children. Amongst the children ( $n=94$ ), those below 5 years took up 61.7% of the demand. This compares well with data from Scotland where it is reported that 99% of children under 5.5 years received a general dental anaesthetic [4].

One third of our children were medically compromised and up to one fifth were those with special needs. However, only 3 children received restorations under G.A. This was mainly due to the constraints of operating time and the lack of qualified pediatric dental personal to undertake such procedures. The majority of the children underwent extractions (88.3%). This also compares well with data from Scotland where 96% of the children undergoing dental general anaesthesia came in for extraction of caries teeth [4]. The majority of our adults presented for the surgical removal of wisdom teeth, probably because the majority of the patients were below 35 years and wisdom tooth problems are more common in younger adults.

In conclusion, this study documents the profile of patients seeking dental treatment under G.A. at RIPAS Hospital and highlights the demand for extraction of multiple caries teeth and the removal of impacted wisdom teeth in the local population.

The trend of increasing patient numbers seeking treatment under a general anaesthetic each year is a reflection of the growing acceptance of Day Care Surgery amongst Bruneians. Efforts must be made to expand and improve this modality of managing dental patients in the near future. Future reduction of general anaesthetic numbers will be dependant on decreasing the number of young children presenting with advanced caries in multiple teeth and improving the oral hygiene of young adults to prevent recurrent pericoronary infections with respect to third molar teeth through preventive measures.

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# An evaluation on the impact of the smoking ban policy in a schools' health program in Brunei Darussalam

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## Abstract

Smoking among adults and youths is a growing epidemic worldwide. Tobacco use among adolescents has detrimental health effects and may lead to tobacco addiction. School-based cigarettes smoking prevention programs could become one of the most effective strategies to reduce tobacco use among adolescents, but the evidence for their effectiveness is not yet clear. There is limited literature focussing on evaluative studies in this area to establish the effectiveness of such programs. Therefore, a study was designed to evaluate the implementation, impacts as well as limiting and promoting factors of the smoking ban policy in a school health program among secondary schools in Brunei Darussalam.

The study was conducted using a cross-sectional design and monitoring evaluation approach. There were 40 participants recruited in this study which comprise key informants, teachers and administrators from seven government and thirteen non-government secondary schools in the country. The most significant limitation highlighted by all participants was a lack of proper smoking statistics database to monitor the smoking trends among students. Therefore, conclusive evidence showing an increase or decrease of smoking trends among students in the schools was not found in this study. Legislation on banning tobacco sales to minors is a crucial factor perceived by all participants in managing smoking activities among students. The religious 'fatawa' about smoking may work in reducing or preventing smoking uptake among the general public and students. Another key finding of the study is an expressed need among teachers for comprehensive smoking prevention health education resources for lower secondary students to enable delay of smoking initiation and potentially lower smoking uptake among the students.

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## Introduction

The prevalence of smoking has reached epidemic proportions among adults and youths in many parts of the world [1]. In 2000, 4.83 million premature deaths in the world were attributable to smoking, with 2.41 million deaths in developing countries [2]. According to U.S Food and Drug Administration (FDA), eighty per cent of tobacco users in United States begin smoking before they reach adulthood and more than 3, 000 children begin to smoke each day, consequently at least 1,000 of those children will eventually die from a tobacco-related illness [3]. Tobacco use among adolescents causes various detrimental health

conditions particularly reduction in lung function, severe respiratory illnesses and accelerate development of cardiovascular diseases [4]

Centre for Disease Control and Prevention (CDC), United States (US) report suggested that school programs designed to prevent tobacco use could become one of the most effective strategies available to reduce tobacco use in the country [5,6]. The report underlines guidelines for school health programs, including; development and enforcement of a school policy on tobacco use; provision of tobacco-use prevention education; provision of program-specific training for teachers; and involvement of parents or families in support of school-based programs.

School policy on tobacco use, smoking ban, health education counselling, disciplinary action, and print advertising campaign are among strategies used in school-based smoking prevention programs. However, evidence

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of the effectiveness of interventions in use in the school-based smoking prevention programs have been equivocal. An evaluative study among secondary schools in Ontario, Canada found that a smoking ban on school property had not affected either smoking behaviour or attitudes towards smoking among students but it should be included among strategies to reduce smoking among youths [7]. While some researchers claim that cigarette smoking policies reduced smoking rates among students [8,9], others argue that smoking bans in schools may be effective in reducing smoking uptake only if students perceive them to be well enforced [10]. Meanwhile, counselling with discipline strategies may help to reduce teenage smoking activities rather than a discipline only strategy in the school-based smoking prevention program, as shown by another study [11]. School based programs with information giving alone are evidently not effective in preventing smoking. A program consisting of social influences models (e.g. anti-tobacco resistant skills training), community interventions and general social competence training (e.g. self-management personal and social skills) may promote the effectiveness of the interventions in preventing children and adolescents from starting smoking [12, 13].

### Smoking ban policy in the school health program

Health problems related to smoking, particularly heart disease and lung cancer are the leading causes of death in Brunei Darussalam. Smoking prevalence in the country appeared to be increasing among the adult population from 20% in 1988 [14] to 36.4% (i.e. 31.1% for men and 5.3% for women) in 1997 [15]. Meanwhile, for early adolescents (i.e. 12 to 15 year olds) the incidence of smoking is reported at approximately 4.5 per cent among boys (data for girls is unavailable). For 15-19 year olds it is reported that 16 per cent of boys smoke as do 1.6 per cent of girls [15].

In Brunei Darussalam, the government responses in tackling health problems related to smoking in the country at school level include incorporating smoking ban policy into the school health program. The Prime Minister's Office (PMO) issued a circular in 1994, declaring all government premises including schools as non-smoking zones [16]. In the year 2001, the smoking ban policy was incorporated into School Health Promoting (Sekolah Mempromosikan Kesihatan – 'SMK') Program and was regulated by the School Health Promotion Unit (SHPU), Ministry of Education (MOE). In the same year, the MOE

rolled out the 'SMK' program in all schools in the country. Also, the MOE has complemented 'SMK' program with other initiatives including school-based anti-smoking health education, anti-drug education within the school curriculum, anti-smoking regulations, counselling services for students and the establishment of peer support groups [17].

The program logic model (PLM) of the smoking ban school health program at the school level is shown in Figure 1. The model is developed and adapted from the Funnel model to describe the underlying causal assumptions linking the program objectives and activities with program outcomes [18].

There is limited literature focussing on evaluative studies in this area to establish the effectiveness of school based smoking prevention programs. Specifically, this study was designed to evaluate the implementation, impacts as well as limiting and promoting factors of the smoking ban policy in a school health program among secondary schools in Brunei Darussalam. The research questions are as followed:

- 1) Has the program been implemented in every schools?
- 2) How has the program been implemented in schools?
- 3) Does the program work in managing smoking among students in the schools?
- 4) What are the barriers and promoting factors for implementing the program at school level?

### Methodology

The study was conducted using a cross-sectional design and monitoring evaluation approach. The data collection process began with recruitment of 14 government and 6 non-government secondary schools in the country, which were randomly selected from MOE Directory Official websites. The process took 2 months to be completed, which began, from 1<sup>st</sup> June till 30<sup>th</sup> July 2005. The primary outcomes measured in this study are reflected in the 12 objectives of PLM objectives, including the availability of action plan for 'SMK' program with anti-smoking initiatives, implementation of the action plan by schools and the availability of health education materials in schools. Standard operational definitions were developed and applied throughout the process of the study, as shown in Table 1.

Figure 1. Program logic model of the smoking ban policy in school health program in Brunei Darussalam

<b>GOAL: REDUCING THE INCIDENCE OF SMOKING AMONG STUDENTS</b>				
<b>Objectives</b>	<b>Program Activities &amp; Resources</b>	<b>Outputs</b>	<b>Outcomes</b>	
			<b>Short-term</b>	<b>Long-term</b>
1) By 2004, 80 per cent of all schools in the country have the action plan for 'SMK' program with anti-smoking initiatives.	'Sekolah Mempromosikan Kesihatan' (SMK) Program was introduced in 2001 within School Health Promotion Unit, MOE.	Smoking ban policy is incorporated into the SMK program,	Action Plan for smoking ban program ('SMK' program with anti-smoking initiatives) is put in place in all schools in the country.	1) Establishment of extensive smoking ban program strategies within the SMK program that include: <ul style="list-style-type: none"> <li>• Cessation interventions</li> <li>• Quit support interventions</li> <li>• Rehabilitation interventions.</li> </ul>
2) By 2004, 80 per cent of schools in the country have implemented SMK program with anti-smoking initiatives.	Smoking ban program ('SMK' program with anti-smoking initiatives) is implemented in all schools.	<ul style="list-style-type: none"> <li>• Seminar on SMK program organized for all schools principals and deputy principals.</li> <li>• Providing consultation and guidance in planning SMK action plan and its implementation to schools.</li> </ul>	All schools in the country have implemented the program.	
3) By 2004, 80 per cent of all schools in the country have health education materials for the 'SMK' program with the anti-smoking initiatives.		Health education materials are provided to all schools.	All schools have health education materials for the SMK program with anti-smoking initiatives.	
4) By 2004, 80 per cent of all schools in the country have implemented various anti-smoking health education activities.	School-based health education anti-smoking activities are implemented	School-based health education anti-smoking activities are implemented in schools, including: essay writing competitions, posters competitions, forums, quizzes & debates	All schools in the country have implemented various anti-smoking health education activities.	2) An evaluation on SMK Program is carried out every five years by MOE.
5) By 2004, 80 per cent of all schools in the country are visited by the inspectorate from the school health promotion unit, MOE.	School visits are carried out by inspectorates from SCHPU to monitor implementation of the program.	5 schools are inspected every month by the inspectorates from SCHPU.	All schools in the country are visited by inspectorate from the SHPU, MOE.	3) Students are compliance to the anti-smoking regulation implemented.
6) By 2004, 80 per cent of all schools in the country are implementing anti-smoking regulations.	Anti-smoking measures are incorporated into School Regulations.	Regulations against smoking in school premises are implemented.	Increasing number of schools has implemented anti-smoking regulations	

Figure 1. Program logic model of the smoking ban policy in school health program in Brunei Darussalam.

Objectives	Program Activities & Resources	Outputs	Outcomes	
			Short-term	Long-term
7) By 2004, 80 per cent of schools in the country are providing counselling services to support students with tobacco addiction.	Counselling units are established in every school to provide support for students with tobacco addiction.	Counselling services are provided in all schools	All schools provided counselling service to support students with tobacco addiction.	5) Students in all schools in the country are exposed to counselling services provided in by schools.
8) By 2004, 80 per cent of schools in the country are utilizing counselling services at the Counselling unit at the School Department.	Counselling services provided by counselling unit at the School Department, MOE for referral cases from schools' principals.	Referrals are made by school principals to the Counselling unit at the School Department, MOE.	Increasing referrals from schools to counselling unit at the School Department.	
9) By 2004, 80 per cent of all schools in the country are implementing Anti-drug education within the school curriculum.	Development of anti drug education within the school curriculum including tobacco use is proposed	Draft of anti-drug education within the school curriculum is completed	Anti-drug education within school curriculum is implemented in schools	4) Changes in school curricula and policies supporting notion against smoking
10) By 2004, 80 per cent of schools in the country have peer-support groups and are implementing some anti-smoking actions	Peer support groups anti-smoking actions are formed in schools.	Peer support groups implemented several anti-smoking actions including: <ul style="list-style-type: none"> <li>Giving out educational material</li> <li>Exhibitions</li> <li>Attending health talks</li> </ul>	Increasing number of peer support groups established in schools.  Increasing number of anti-smoking actions implemented by peer-support groups, such as: <ul style="list-style-type: none"> <li>Peer counselling services</li> <li>Focus groups</li> <li>Workshops</li> </ul>	6) National Students Peer Support Action Body against smoking established in the country.  7) Lower incidences of smoking among students.
11) By 2004, smoking incidences among students lower by 3 per cent.				
12) By 2004, smoking incidences among students lower by 3 per cent.	Smoking statistic among students is collected each year by each school.  Comparison of previous year smoking incidence with the current incidence.	Data on smoking statistic among student compiled each year.  Smoking data reported each year.	Database of smoking statistic established by each school.	Evaluation conducted on the smoking data collected.

Figure 1. Explains the program logic of the smoking ban school health program which shows the underlying causal assumptions linking program objectives and activities with program outcomes. There are 12 objectives of the program which are in hierarchical order according to its implementation process. The PLM is adapted from Funnel (1997) model, which comprise of objectives, program activities, outputs and outcomes.

The targeted population was 82 participants within the age range 21 to 54 years old. The key informants in this project are Head of SHPU, SHPU Inspectorate, Counselling teachers and Discipline teachers. The main criteria for selecting the sample were that the schools must enrol students from age group 12 to 18 years old and come from the four main districts in the country. There were total 40 participants invited in the study which comprised Head of SHPU (1), School Inspectorate of SHPU (1), schools

administrators (12), counselling teachers (7), disciplinary teachers (12) and teachers (7) from government (13) and non-government (2) secondary schools from the four districts in the country. Some of the targeted participants are not recruited in the study because of the following; a limited time frame (one month) to conduct data collection and there was a lack of response from some schools and some were unable to fit an appointment within the given time frame.

Table 1. Operational Definitions for the Study

TERM	DEFINITIONS
1) Urban schools	Schools located in the central business district of the country, i.e. Brunei-Muara District.
2) Rural schools	Schools which are located in other districts and not within the central business district of the country, including Tutong District, Kuala Belait District and Temburong District
3) Program implementation	The program initiatives that has been implemented by the organization at any point of time since the year of 2001
4) Reported smoking incident	An incident where a student is found smoking by teacher/s or school administrators in school compound
5) Incidence	No. of smoking cases for student who are found smoking in the school compound as reported in the past 12 months by the teachers.
6) New initiative	It is any form of initiatives implemented by the school at any point of time since the year of 2001, which is not included in the program logic initiatives.
7) NTCP	National Tobacco Control Policy (which is implemented in Brunei Darussalam).
8) 'SMK' Program	'Sekolah Mempromosikan Kesihatan' program is school promoting health program in which anti-smoking ban is incorporated into the program since 2001 regulated by SHPU at the Ministry of Education, Brunei Darussalam.

Table 1. Explains the definitions used throughout the process of the study and the purpose is to standardise the data collected in the study.

The recruitment process begins with a formal letter (written in English and Malay language) submitted to the MOE (Brunei) to obtain permission to conduct the study. An Ethics approval letter from the University, Plan Language Statement (PLS) and consent form were attached to the application letter. Upon approval given by the MOE, the invitation letter and a package of information was sent to all the schools. The investigator made follow up phone calls to the school administrators to set up appointments for discussion.

School administrators were explained about the study during the meeting, before obtaining the written consent to participate in the study. Similarly, potential participants are also recruited during the meeting based on the role of participants and suggestions from the administrators. The data were collected using a triangulation approach using

interviews, documentation review and observations. Each interview session was carried out for 30 to 45 minutes and was audio recorded with written permission. The summary of each interview was shared with each of the participants for verification. During the investigator’s visit in each school various documents were reviewed including the school annual report and the school smoking ban school policy. The general environment of each school was observed for physical indicators of the implementation of smoking ban policy and smoking activities occurring in the environment. The physical indicators include smoking ban signs boards, health education materials and signs of smoking activities such as cigarettes butts on staircases and hallways. The flow of the study is shown in Figure 2.

The interviewee responses for all participants were transcribed and the transcripts from the Malay speaking respondents were back-translated into English by the

Figure 2. The flow of the study.

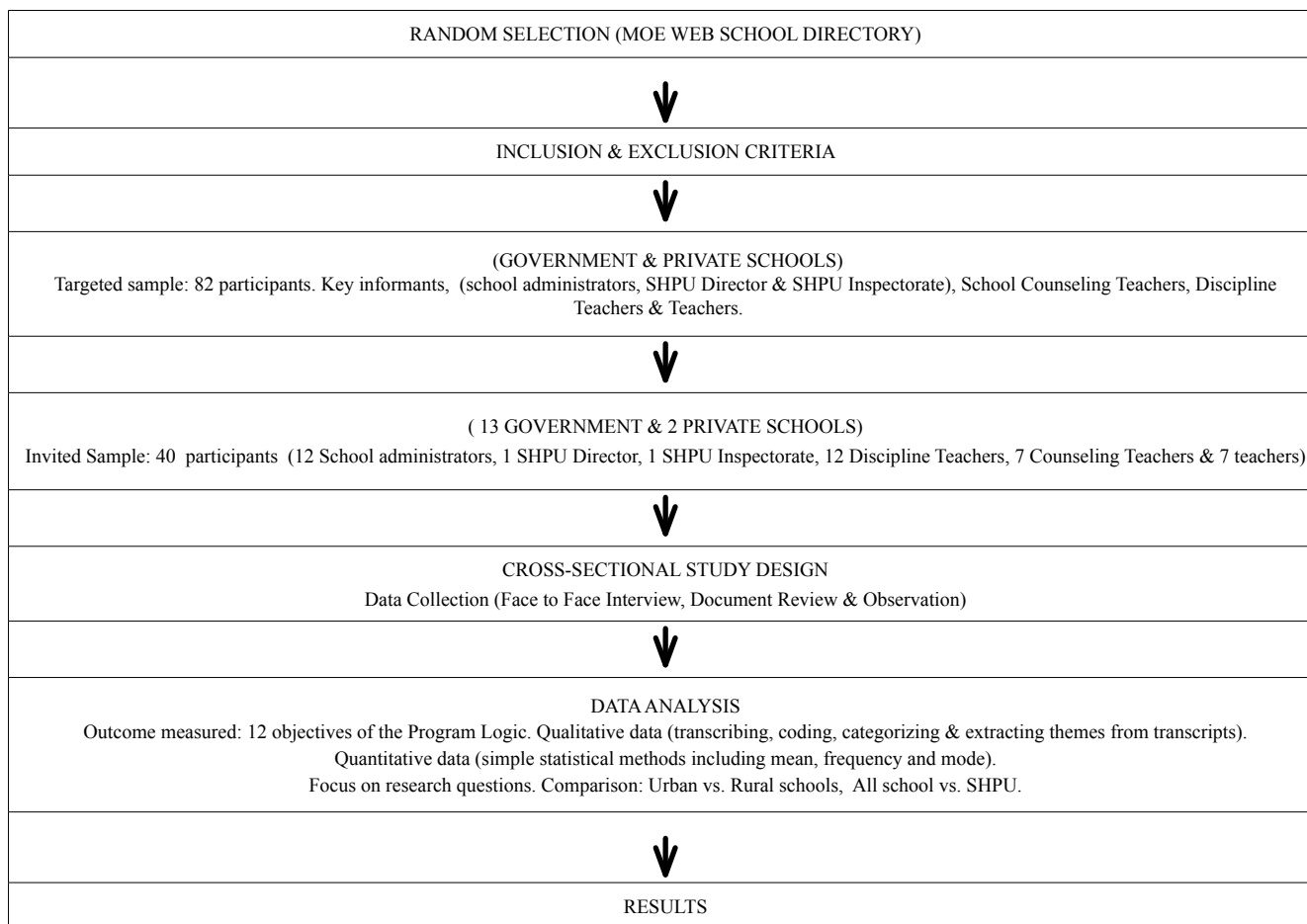


Figure 2. Explains the data collection and analysis process of the evaluative study of the smoking ban school health program as conducted by the investigator.

investigator with the assistance of qualified professionals. The data were analyzed according to the four research questions and the primary outcomes. All the data were coded and recurring emergent themes were identified by constant comparison of the interview transcripts. The transcripts for each participant were sorted according to each organization (i.e. school and SHPU) and then the similar themes from each organization were grouped according to urban schools, rural schools and SHPU. The quantitative data were analyzed using simple statistical calculations including frequency distributions, mean and percentages. Then, the investigator compared the analyzed data based on urban schools and rural schools as well as all schools and SHPU to examine similarities as well as differences in perspectives and statistical indicators in the respective groups.

## Results

Has the program been implemented in every schools?  
(Research question 1)

### *Urban & Rural Schools*

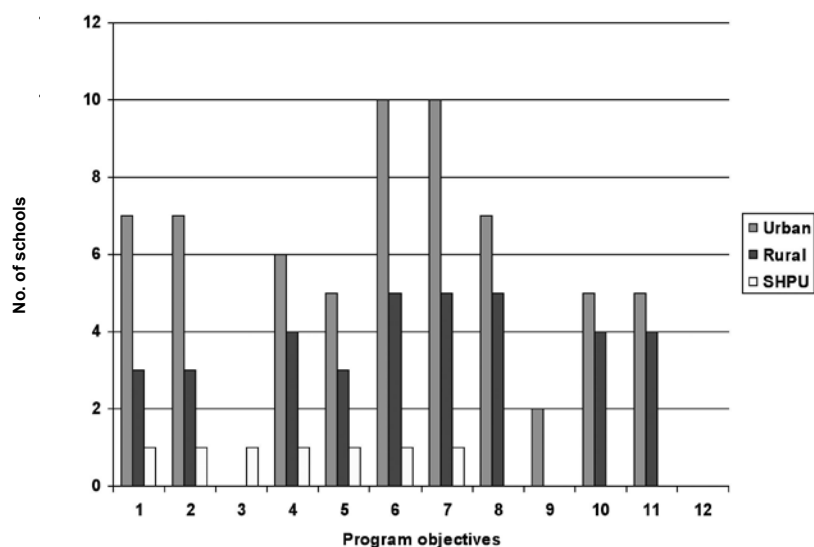
All schools in the study have reported implementing the program, but the number of program initiatives implemented (i.e. based on the program logic) by the schools varied from one another, as shown in Table 2.

### *School Health Promotion Unit (SHPU)*

Table 2. Reported program initiatives implemented by urban school group, rural school group and SHPU (based on the PLM).

US	PLO	Total No	RS	PLO	Total No	SHPU	PLO	Total No
1) A	1,2,4,5,6,7,8,9,10 & 11	10	1) K	1,2,4,6, 7, 10 & 11	7	1	1,2,3,4,5,6 & 7	7
2) B	1,2,6,7 & 8	5	2) L	4, 5, 6, 7, 8, 10 & 11	7			
3) C	6, 7,8,10 & 11	5	3) M	1, 2, 4, 5, 6, 7, 8, 10 & 11	9			
4) D	1, 2, 4,5,6,7 & 10	7	4) N	1, 2, 6 & 7	4			
5) E	4, 5,6,7,8,9,10 & 11	7	5) O	4, 5, 6, 7, 10 & 11	6			
6) F	1, 2, 4,5,6,7,8,10 & 11	9						
7) G	6 & 7	2						
8) H	1, 2, 6 & 7	4						
9) I	1, 2, 4,5,6,7 & 9	7						
10) J	1, 2, 4, 6, 7, 8 & 9	7						

Reported Program Objectives Reported by Schools and SHPU



The figure from Table 2 above explains the 12 objectives of the program logic for the smoking ban school health program with the total number of the program initiatives implemented by schools and SHPU. The numbers of schools implementing the program initiatives are shown according to the given categories (i.e. urban school group, rural school group and SHPU).

Meanwhile, SHPU reports that “Yes the program has been ‘rolled out’ to all schools in the country since 2001. It is estimated 80 per cent of schools have implemented the program by 2004.”

How has the program been implemented in schools?  
(Research Question 2)

*Urban & Rural Schools*

The primary strategies in managing students who are found smoking in the school compound as reported by urban and rural schools are anti-smoking regulation and individual counselling. Yet, the schools have not clearly reported having health education materials and achieving smoking incidences among students lowered by 3 per cent each year, as shown in Table 2. Both groups tend to impose verbal warnings for disciplinary action and disciplinary action (unspecified) as the main strategies

in dealing with teachers and staff found smoking in the school compound.

*SHPU*

SHPU reported implementing seven (7) program initiatives (i.e. based on the program logic), as shown in table 2. Participant ‘A’ states that “...according to MOE school regulation, teachers and staff caught smoking in the school compound will be given disciplinary action and repeated offenders will be suspended from work...”

Both schools and SHPU claimed to have implemented ten new initiatives to complement the current program which is reported by the participants in the study (as shown in Table 3).

Does the program work in managing smoking among students in the schools? (Research Question 3)

Table 3. Reported new initiatives implemented by the urban school group, rural school group and SHPU

<b>Urban</b>	<b>Rural</b>	<b>SHPU</b>
1) Incorporating Islamic perspectives on anti-smoking and anti-drug education into the school curriculum. 2) Parent-teacher meeting every end of the school semester. 3) Providing website access for parent to monitor their children school progress reports, including academic results and disciplinary performance. 4) Working with the community by distributing school contact numbers.	1) Anti-smoking drama presentation (role play) organized by students as part of annual school project. 2) School health promotion unit is established in the school to regulate health education programs.	1) Organizing forums for school administrators and communities. 2) Establishing smoking task force involving various government & non-government agencies. 3) Collaboration with other multidisciplinary personnel. 4) Implementing monitoring strategies by direct contacts with school and obtaining via feedbacks.

Table 3. Shows the list and number of new initiatives implemented as reported by some participants in the given groups to complement the program. The urban (urban school group) has reported of implementing 4 new initiatives, the rural (rural school group) has reported 2 and SHPU has reported 4, accordingly.



## Urban & Rural Schools

### Smoking Trends

All participants have reported that the program works but with some limitations, as shown in Table 4. Five schools from all schools reported an increase in smoking trends among students, whereas only two schools reported a decrease. It is inconclusive that the smoking trend

among student increases or decreases among students in both groups. The range of smoking incidents occurred in schools premises reported for the all the schools in the year 2004 are 0 to 29. All schools have reported that there is no proper documentation of smoking statistics available to validate 3 per cent lower smoking incidences per year in their schools. The data are based on reported cases by teachers and their observation on smoking activities occurring in the school compound.

### Characteristics of Reported Smoking Incidents

Table 4. Reported smoking trends among students by urban school group, rural school group and SHPU

USG	TRENDS	I	SMOKING INCIDENTS
1) A	Stable	23	Male. Lower & Upper
2) B	Stable	U	U
3) C	Unknown	U	U
4) D	Increase	U	More male than female. More Lower & Upper.
5) E	Zero	0	U
6) F	Unknown	U	U
7) G	Increase	U	U
8) H	Stable	U	More male than female. More Lower & Upper.
9) I	Decrease	0	Lower
10) J	Increase	5	Lower & Upper.
RSG	TRENDS	INC	CASES
11) K	Decrease	13	Male. Lower & Upper
12) L	Zero	1	Male. Upper
13) M	Stable	29	More male than female. More Lower & Upper.
14) N	Increase	19	More Male than female. More Lower & Upper.
15) O	Increase	23	More male than female. More Lower & Upper.
S	TRENDS	INC	CASES
PA	Stable	3 to 4 %	Male and female cases (increasing over the years)
PB	High	U	U

Table 4. Explains the reported smoking trends, incidence (I) and the characteristics of the smoking incidents reported by all participants in schools and SHPU. The letters represent the schools which have participated in the study except for PA and PB. The schools are categorised into urban and rural school group as shown above. There is only slight difference between range of program initiatives implemented between urban (2 to 10 initiatives) and rural (4 to 9 initiatives) schools. However, there is no difference in the average number of program initiatives implemented between the urban (6) and rural (6.6) school group.

Legend:

USG (urban school group)

RSG (rural school group)

S (SHPU)

PA (participant A from SHPU)

PB (participant B from SHPU)

I refers to incidence

U (Unknown)

Eight (8) out of fifteen (15) schools have reported that many lower secondary male students are caught smoking in the school compound (as shown in table 4). An Administrator from School H states ‘...our teachers reported that many of the lower secondary students are found smoking in school premises while most of the upper secondary students are found smoking outside the school premises. There are more male students than female students who are found smoking in school compound...’ The majority of smoking incidents reported by both groups are from lower secondary students and there are more male students who are found smoking than females.

### Major Impacts

The major impacts of the program which are commonly reported by the participants from both groups (as shown in Table 5) include increase in awareness on negative effects of smoking on health and increased compliance to the school smoking ban regulations among students, and teachers/staffs. An Administrator from School K reported that, ‘...since the implementation of the program, students are not found smoking in visible areas of the schools but they tend to smoke in hidden areas like inside toilets and outside school premises such as nearby shops...’ The participants perceived that the program has limited positive impact on knowledge and behaviour about smoking prevention among students, teachers and staffs.

### SHPU

Table 5. Reported impacts of the program by urban school group, rural school group and SHPU

No	Urban	Rural	SHPU
1	Teachers, staffs and students are reported compliance to smoking ban regulation in the school (9 schools).	The teachers reported increasing students’ awareness about smoking ban regulations and smoking health hazards (5 schools).	It estimated 80 per cent of all schools have implemented ‘SMK’ program
2	The teachers reported increasing students’ awareness about smoking ban regulations and smoking health hazards (6 schools).	Only teachers and staffs are reported compliance to school smoking ban regulations but students are not (4 schools).	All schools implemented smoking ban regulations
3	Students don’t smoke visibly in school as reported by teachers (3 schools).	Students don’t smoke visibly in school as reported by teachers (3 schools).	Increase awareness on smoking health hazards and smoking as socially unacceptable behaviour among students and teachers.
4	Only teachers and staffs are reported compliance to school smoking ban regulations but students are not (1 school).	Reduce number of students found smoking in the school (2 schools).	
5	Smoking prevalent is reported zero by teachers (1 school).	Teachers, staffs and students are reported compliance to smoking ban regulation in the school (1 school).	
6	Smoking prevalent is reported unknown by teachers (1 school).		
7	Some evidences of smoking noted, i.e. cigarettes but found in school compound (1 school).		

Table 5. Explains the new program initiatives which has been implemented (as reported by the participants from the schools and SHPU) to complement the current program. The number of school which has implemented the new initiatives is indicated at each given initiative as shown above. The schools have claimed implementing six (6) new initiatives and four (4) for SHPU to complement the current program.

Participant ‘A’ reports that ‘...according to MOH report, the prevalence of smoking among school children is stable at approximately 3 to 4 per cent. Smoking among young girls is found to be increasing...’ SHPU has reported that there is no proper smoking database system available yet to validate the reported and observed smoking data. SHPU estimates the smoking incidence among students in each school will be reduced approximately from 1 to

3 per cent each year as a result of the implementation of ‘SMK’ program in all schools. SHPU has reported that the program is perceived to have three major impacts (as shown in table

5). Participant ‘B’ states that ‘...those major impacts are only based on observation and reports during the school visits and feedbacks from the school administrators...’

What are the barriers and promoting factors for

implementing the program at school level? (Research Questions 4)

The following are four main categories of perceived barriers and promoting factors in implementing the program as reported by all participants: 1) causes of smoking among

students, 2) school system, 3) organizational and 4) policy/legislation, as shown in Table 6.

### Barriers

Table 6. Reported barriers and promoting factors of implementing the program as perceived by the urban school group, rural school group and SHPU

<b>BARRIERS</b>					
<b>Urban</b>	<b>N</b>	<b>Rural</b>	<b>N</b>	<b>SHPU</b>	<b>N</b>
<b>1. REASONS/CAUSES OF SMOKING AMONG STUDENTS</b>					
1) Peer pressure (close friends smoke)	10	1) Peer pressure i.e. close friends smoke.	5	1) peer pressure (close friends smoke)	1
2) Role Modelling (parent & sibling who smoke)	8	2) Role Modelling i.e. parent & sibling who smoke.	5	2) Role Modelling (parent smoke at home & teacher smoke in school compound)	1
3) Family stressors (i.e. divorce & single family)	3	3) Family stressors (i.e. divorce & single family).	1	3) Smoking advertisement	1
4) Boosting self-image.	2	4) Curiosity to try cigarettes.	1	4) Adolescent developmental (i.e. Boosting self-image)	1
5) Lack of parental supervision.	2	5) Cheap cigarettes prices (affordable).	1	5) Cheap cigarettes prices.	1
6) Curiosity to try cigarettes.	1				
7) Cheap cigarettes prices.	1				
8) Stress reliever.	1				
<b>2. SCHOOL SYSTEM BARRIERS</b>					
1) Lack of support from parents.	3	1) Lack of teachers' time.	3	1) Lack of support & monitoring efforts from some schools &	1
2) Lack of budget.	3	2) Heavy teaching workloads.	3	2) Lack of reinforcement of smoking ban regulations among teachers who smoke in school compound.	1
3) Health education talks not interesting.	2	3) Lack of support from parents.	3		
4) Lack of teachers' time.	2	4) Lack of budget/funding.	2		
5) Heavy teaching workloads.	2	5) Lack of support from teachers and staffs.	1		
6) Lack of cooperation among teachers.	1	6) Lack of community support.	1		
7) Trespassers selling cigarettes to students	1	7) Geographical location.	1		
8) Lack of community support	1				
9) Lack of cooperation between teachers and students	1				
10) Limited manpower.	1				
<b>3. ORGANIZATIONAL BARRIERS</b>					
1) Lack of smoking prevention health education resources.	2	1) Effective comprehensive smoking prevention program (not available)	1	1) Lack of publicity on school health promotion programs, &	1
2) Comprehensive smoking prevention health education program not available	1	2) Lack of support from MOE.	1	2) Lack of funding support from private sectors & NGOs.	1
3) Limited resources for counselling services (i.e. training).	2				
<b>4. POLICY/LEGISLATION BARRIERS</b>					
1) NTCP: lack of reinforcement of smoking ban regulations.	5	1) NTCP: lack of reinforcement of smoking ban regulations.	5	1) NTCP less effective in changing behaviour, adult population &	1
2) NTCP: Not made available in hard copy to school.	3	2) NTCP: lack of reinforcement on increasing cigarettes price.	5	2) mainly focussing on general	1
3) NTCP: lack of effective strategies in changing smoking behaviours.	2	3) NTCP: Less focus on smoking prevention initiatives for youths.	1	3) Lack of evaluation on its effectiveness.	1
4) NTCP: focus on information giving only.	2				
5) NTCP: lack of effective anti-smoking health promotion messages.	1				
6) NTCP: Not made explicit to the public.	1				
7) NTCP: Less focus on smoking prevention initiatives for youths.	1				
8) NTCP: lack of reinforcement on increasing cigarettes price.	1				

Table 6. Continued

<b>PROMOTERS</b>					
<b>2. SCHOOL SYSTEM</b>					
<b>Urban</b>	<b>N</b>	<b>Rural</b>	<b>N</b>	<b>SHPU</b>	<b>N</b>
1) School, parent and community involvement.	4	1) School, parent and community involvement.	4	1) Teachers promote good role model	1
2) Availability of full-time counsellor.	3	2) Reduce teaching workloads for teachers who are involved in the program.	2	2) More reinforcement of smoking ban regulations in schools among teachers, staffs and students,	1
3) Increase school authority to expel students.	2	3) Availability of full-time counsellor.	1	3) Schools must adapt multi-sectoral approach ,	1
4) Reduce teaching workloads for teachers who are involved in the program.	2	4) More funding.	1	4) Promote community participation,	1
5) Interesting health talks appropriate for youths.	2	5) Offer rewards/incentives for students who stopped smoking.	1		
6) Promote cooperation between schools and parents.	2				
7) Promote cooperation between teachers & students.	1				
8) Active participation of Peer Support Group.	1				
9) More funding from NGOs and private business agencies.	1				
10) Availability of day security personnel.	1				
<b>3. ORGANIZATIONAL</b>					
1) Availability of comprehensive smoking prevention program.	5	1) Availability of health education materials/ resources.	1	1) Increase cooperation between SHPU and schools.	1
2) Availability of health education materials/resources.	4	2) More support from MOE & SHPU.	1	2) Increase cooperation between government, public sectors and the community,	1
3) More support from MOE.	1	3) Availability of comprehensive smoking prevention program.	1	3) MOH established smoking cessation clinic and quit hotline,	1
4) Improve communication between schools & MOE.	1			4) Active participation of National Tobacco Committee & National Health Promotion Committee,	1
<b>4. POLICY/LEGISLATION</b>					
1) Implementation of legislation banning tobacco sales to minor.	10	1) Implementation of legislation banning tobacco sales to minor.	5	1) NTCP includes initiatives targeting children and youth,	1
2) NTCP: inclusive of comprehensive smoking prevention health education program.	3	2) NTCP: Reinforcement of smoking ban regulations.	4	2) Implementation of revised legislation on tobacco by including Islamic rules & ban on tobacco sales to minor.	1
3) NTCP: Reinforcement of smoking ban regulations.	2	3) NTCP: Reinforcement on increasing cigarettes prices.	1		
4) NTCP: copy of the policy made available to all school as reference.	1				
5) NTCP: Transparency of policy initiatives to the general public including schools.	1				
6) NTCP: Reinforcement on increasing cigarettes prices.	1				

Table 6. Explains reported barriers and promoting factors in implementing the program as perceived by the participants. The responses are categorised by urban school group, rural school group and SHPU. The total number of schools reporting the factors is indicated at each respective barriers and promoters as shown above.

*Urban & Rural Schools*

Peer pressure (i.e. close friends smoke) and role modelling (i.e. parents and siblings who smoke) and family stressors (i.e. divorced and single parent families) are among reported causes of smoking as reported by teachers when students are caught smoking in the school compound. Lack of support from parents and lack of budget are among the five (5) common perceived barriers related to school system reported by urban and rural schools. A total of five (5) perceived organizational barriers in implementing the program are highlighted by the schools. The participants reported that unavailability of comprehensive smoking prevention health education program is perceived as the most important barrier in effectively managing smoking uptake among students. The following are the three policies and legislation barriers for both groups (which are linked to reinforcement, pricing and initiatives): 1) lack of reinforcement of smoking ban policy, 2) lack of reinforcement on increasing cigarettes price and 3) less focus on smoking prevention initiatives for youths.

*SHPU*

Similarly, SHPU has reported peer pressure (i.e. close friends smoke) and role modelling (i.e. parent and teachers who smoke) as the main causes of smoking as reported by the schools. The unit has reported the following school system barriers in implementing the program which include lack of support and monitoring efforts from some schools. The organizational barriers claimed by SHPU are lack of publicity on school health programs and lack of funding from the private sector. National Tobacco Control Policy (NTCP) mainly focuses as on the general adult population and is among barriers related to policy and legislation reported by the unit.

**Promoters***Urban & Rural Schools*

The schools have reported four (4) common promoting factors associated with the school system that relate to staffing, community, resources and funding. The availability of a comprehensive smoking prevention program and health education materials/resources are significant organizational promoters in implementing the program in schools as reported by all participants. Both, groups perceive the following three policies and legislation promoting factors as important: 1) Legislation banning tobacco sales to minors needs to be implemented and NTCP must 2) reinforce smoking ban regulation and 3) also reinforce an increase in cigarette prices.

*SHPU*

Meanwhile, SHPU has highlighted four (4) school system related promoting factors including teachers being good role model and reinforcement of smoking ban regulations in schools. The unit has reported four (4) perceived organizational barriers in implementing the program, including increased cooperation between the unit and schools. It has expressed a different view on organizational promoting factors compare to the schools. The promoters related to policy and legislation propose by unit relate to expansion of the policy target audience. Participant 'B' states that '...The NTCP is apparently effective in raising awareness among the public about smoking hazards via health education talks, posters, and issuing religious 'fatawa' or religious rules about smoking. But it is less effective in changing behaviour which may be due to a lack of evaluation and lack of hard evidence to show its effectiveness. The policy has a huge focus on the adult general population, hence there is a need to incorporate more initiatives targeting children and youths...'

**Discussion**

The investigator has found that the smoking ban school health program is implemented in all schools in the study but with some limitations. The most significant limitation highlighted by all schools and SHPU is a lack of proper

smoking statistics database or documentation system available to monitor the smoking trends among students. Therefore, there is no conclusive evidence showing an increase or decrease in smoking trend among students in the schools in this study. This may affect the effective planning of the current and future anti-smoking program for the targeted population.

In regards to the program implementation, there is only a slight difference observed on how the program has been implemented at urban and rural schools. The schools rely heavily on smoking ban regulations, brief counseling and health talks (posters) as the primary strategies in managing and preventing the students from smoking in the schools. There is no statistical evidence available to show the strategies work in managing smoking habit among the students. The findings correlate with the results of other studies which are discussed above [7]. However, the investigator has found that the interventions may increase awareness about the negative health impacts of smoking and may promote compliance of smoking ban regulation in the schools among students and teachers, as reported by the participants.

Few differences are identified in the process of the program implementation and delivery between SHPU (MOE) and the schools, which surface as barriers in carrying out the program as perceived by the participants. Those gaps may include a lack of effective communication mechanism between the organizations, a lack of an effective monitoring system built into the program and a lack of outcome success indicators tailored according to the needs of each organization in implementing the program. The three major causes of smoking as reported by the participants may need to be tackled by designing comprehensive school-based smoking prevention programs by incorporating various strategies, including social influences model and community interventions, as suggested by previous studies [12, 13].

There is also a profound policy and legislation issue which can make a significant difference in reducing the smoking incidence among students. The relevant authority may want to consider making the National Tobacco Policy more transparent, comprehensive and inclusive as suggested by the participants as mentioned above. As reported by the participants, the religious 'fatwa' about

smoking may work in reducing or preventing smoking uptake among the general public and students. However, there is lack of evaluative evidences to validate the reports. Legislation on banning tobacco sales to minors is a crucial apparatus as perceived by all participants to manage smoking activities among students in schools. Another key finding of the study is an expressed need among teachers for comprehensive smoking prevention health education resources for lower secondary students to enable delay of smoking initiation and potentially lower smoking uptake among the students.

The main limitation of the study is that most of the data are based on reports from the key informants and teachers only, which are subjected to views and perception of the respondents, and may or may not reflect the views of the students. However, the study findings can be generalized to other schools in the country as the sample is inclusive of government and non-government schools from rural and urban areas of the four main districts. There is lack of statistically significant data to associate the reduction of smoking incidence among the students to the program activities.

## Conclusions

The findings of this study have implications not only in strengthening the current program but also providing baseline information for designing future evidence-based school health education programs in the country. Several program activities were identified and considered significant to the program, which need to be explored, utilized and effectively implemented. Counselling services, community partnership as well as religious 'fatwa' and other culturally appropriate activities are the main strengths of this program that can be fully utilized for effective implementation of the program. The findings also reflect the needs of the audience and stakeholders of the program which may be useful for the policies makers in planning and implementing more cost effective policies, particularly in public health policies in the near future for the country. This study is intended to enrich evidence and generate more research conducted in promoting the quality of life of young people in Brunei and in other counties with similar socio-cultural context.

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## Possible role of an *Anopheles* transient receptor potential channel homologue in malaria parasite transmission

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### Abstract

Midgut glycoproteins are potential receptors for pathogens such as arboviruses and malaria parasites that are transmitted by vector mosquitoes. An antiserum prepared against wheat germ agglutinin binding *Anopheles tessellatus* midgut proteins was used to screen an *An. gambiae* cDNA library. A clone homologous to the gene for a *Drosophila melanogaster* transient receptor potential-gamma cation channel protein was identified.

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### Introduction

Glycoproteins associated with the luminal surface of the mosquito midgut are potential receptors for mosquito transmitted pathogens such as malaria parasites [1-6] and arboviruses [7]. Antibodies against wheat germ agglutinin-binding midgut glycoproteins, ingested in an infective blood meal, block transmission of *Plasmodium vivax* and *P. falciparum* to the malaria vector *Anopheles tessellatus* [6]. To identify the relevant target midgut glycoproteins, a cDNA expression library of female *An. gambiae* abdomen was screened with the same antiserum against wheat germ agglutinin binding midgut glycoproteins.

### Materials and Methods

Wheat germ agglutinin binding glycoproteins from sugar-fed female *An. tessellatus* midgut were purified and used to produce a rabbit antiserum as previously described [6]. The antiserum, pre-absorbed with *E. coli*, was used

to screen an *E. coli* lambda/bluescript (ZAP Express®/pBK-CMV; Stratagene, USA) cDNA library derived from female *An. gambiae* abdomen [8] according to standard procedures [9] modified by the manufacturer's instructions (Stratagene, USA). Cloned DNAs from antibody-reactive clones were excised and sequencing of these clones was performed from both the 5' and 3' ends. Nucleotide sequences were compared by BLAST search against the annotated *An. gambiae* Ensembl database (Wellcome Trust Sanger Institute, www.ensembl.org) and subsequently also with the *Drosophila melanogaster* genome.

### Results

BLAST analysis of the 5'- and 3'-sequences of one unique clone obtained in the antibody screen, against the *An. gambiae* genome Ensembl database, showed that this was almost identical to a sequence in the contig CRA\_x9P1GAV5CRW\_68 present on the right arm of chromosome 3 of *An. gambiae* [Fig 1]. This *An. gambiae* sequence is homologous to the trp gamma gene product of *D. melanogaster*; (probability e-71 and 35% identity in amino acids; gbAAF53548.1(AE003652), which is a transient receptor potential cation channel protein, TRPgamma. The sequence of the predicted *Anopheles* protein showed several potential N-linked and O-linked glycosylation sites.

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Figure 1. Comparison of the DNA sequences of a part of the contig CRA\_x9P1GAV5CRW\_68 from the right arm of chromosome 3 of *An. gambiae* (Contig clone) and that of the antibody-reactive clone obtained using forward (clone E forw) and reverse (clone E rev) sequencing primers

Figure 1

Contig clone	18750	gttgatgaagggcttcaatataagccaccgcccggcaccggacccggc	Contig clone	19449	cgggacgggaaggagcacgcaccactatcacttgcatttcggcgcgt
clone E rev	14	-----gcccggcaccggacccgggccc	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	18800	agcatttgaccccgtgctggagtattgctgcagctgccggaccattcg	Contig clone	19499	ggcagcactgaagcgaagcggaaaaagtctccaacgcccaactcca
clone E rev	34	agcatttgaccccgtgctggagtattgctgcagctgccggaccattcg	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	18850	ccgcacgagctgttgcggcgctgttggcccgggttgacaccgaagaa	Contig clone	19549	gcccgtgctggagccaccgtgcgagctgccctggtaacgaacgcgat
clone E rev	84	ccgcacgagctgttgcggcgctgttggcccgggttgacaccgaagaa	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	18900	ggcactgcaccaggtgaatccgatgcatcagttatgctgcagctgcaga	Contig clone	19599	actacgacgggtaatacaagcagtaaggtacgttggactttgcagctag
clone E rev	134	ggcactgcaccaggtgaatccgatgcatcagttatgctgcagctgcaga	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	18950	gctcgttcggggagaacaacaaccgatccatcgctggcaaaagctggca	Contig clone	19649	ccgagtagcgggacattgatttagggagctttagatattatggttgtt
clone E rev	184	gctcgttcggggagaacaacaaccgatccatcgctggcaaaagctggca	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	19000	ccgaagttaactccaaaagctccaggatcgacacaagaagcgggg	Contig clone	19699	gctggcagtgccacgtacctaacacaggggtggcattccaattgattact
clone E rev	234	ccgaagttaactccaaaagctccaggatcgacacaagaagcgggg	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	19050	tccgttgaattatcaaaaacctcaaaaaaggcaccatttaacgatgct	Contig clone	19749	ttcattgccattaccacagtgatgtgacgcactctgcgggggtgtcat
clone E rev	282	-----	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	19100	ttctcctccgagggaacgcttattgaagcggcacaacatggcagcgtgt	Contig clone	19799	tcgctgttgattacagcagctaccacattacgataattcattcaaacga
clone E rev	282	-----ggaacgcttattgaagcggcacaacatggcagcgtgt	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	19150	cgaagttatcgggcctcccgatcgggaagactgggtgtgcaaccacgggt	Contig clone	19849	atcaagctctatagtgcaatgagcaatatctcttgggtggcgacactg
clone E rev	319	cgaagttatcgggcctcccgatcgggaagactgggtgtgcaaccacgggt	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	19200	ccgggtcggggcgaatcgccagccacagcaatagcccggcgtcggatga	Contig clone	19899	acacgcttctcaactccgaggtactgaaacgtgcttccacgctac
clone E rev	369	ccgggtcggggcgaatcgccagccacagcaatagcccggcgtcggatga	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	19250	agccatcacggagtcaccgtccgattcgaaccgagcctggatcgcccgg	Contig clone	19949	cgacgcggcgcaagcgcagaaccggaagcaccggcagcgtacggccg
clone E rev	419	agccatcacggagtcaccgtccgattcgaaccgagcctggatcgcccgg	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	19300	acgtcgagcagtgctccgatccacacaagcatcacaatcagcgcagccgg	Contig clone	19999	gcccggcacgagcgaacgcaaaagccagcagcactcagcagcagcgt
clone E rev	469	acgtcgagcagtgctccgatccacacaagcatcacaatcagcgcagccgg	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	19350	acggaccggggg-caccaagatcggcggcagcagcgtggaagtgcagta	Contig clone	20049	cgaaggtcggcaccgttaacacctccaccagggagagagcgtcgtac
clone E rev	519	acggaccggggg-caccaagatcggcggcagcagcgtggaagtgcagta	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
Contig clone	19399	cgacgacgacagcagcagcgggacggccacggcgaacggcaagaacggg	Contig clone	20099	agcagccggcgagcgggtgcccggccatcagctggccgtgcacaagcac
clone E rev	569	cgacgacgacagcagcagcgggacggccacggcgaacggc-----	clone E rev	606	-----
clone E forw	946	-----	clone E forw	946	-----
			Contig clone	20149	cagaagatcctccggcggcaggaacagctccaacgaacctgtctacgctt
			clone E rev	606	-----cggaagaa-----
			clone E forw	946	-----
			Contig clone	20199	gcaggagcagcgtgatagcagtgatggtggtggtggtgaggcgtcag
			clone E rev	615	-----
			clone E forw	946	-----

Contig clone clone E rev clone E forw	20249 615 946	taggggcaggtggagcgtgtgacacgtccggcgaccggctcagcactggt ----- -----	Contig clone clone E rev clone E forw	21099 615 846	gctaccaacaacggagactcatatgacgcaccctggagacaggggggg ----- gttaccacaacaggagactcatatgacgcacccttgagacaggggggg
Contig clone clone E rev clone E forw	20299 615 946	cagtcgttggccacgtccacgtctacgtcgtgccgaagattccggcgct ----- -----	Contig clone clone E rev clone E forw	21149 615 796	-----tcattctctttaaaccgatagctctgtaaggacgggtctgatg ----- ggggggtcattctctttaaaccgatagctctgtaaggacgggtgtgatg
Contig clone clone E rev clone E forw	20349 615 946	aacgccactacggggcatttacctccagggtggttataggggagac ----- -----	Contig clone clone E rev clone E forw	21193 615 746	caagcgcgcacacctaaactacacgatacatcttaggcacgataaga ----- caaccgcgcacacctaaactaacacgatacaccttaggcacgataaga
Contig clone clone E rev clone E forw	20399 615 946	ggtagcgcgcaagggtgagcactattgtatgtaaatagggtgctggcg ----- -----	Contig clone clone E rev clone E forw	21243 615 696	aagacatactacaaccgctccgaatccaataaagttagttaagcaga ----- aagacatactacaaccgctccgaatccaataaagttagttaaacaga
Contig clone clone E rev clone E forw	20449 615 946	ctcaaggcgttgagcgcacgtctaacggaacaatgagtgtaaaactgct ----- -----	Contig clone clone E rev clone E forw	21293 615 646	tagattacttatcagcataaaagagtaaaaccagttgattagtagggtgc ----- tagattacttatcagcataaaagagtaaaaccagttgattagtagggtgc
Contig clone clone E rev clone E forw	20499 615 946	aaaagcatcaatttaaacgtggtggcgaagaagtaaggcgaatggtta ----- -----	Contig clone clone E rev clone E forw	21343 615 596	cgaggagtgtataaggagtgacggggacacgcaaatcgaggatcgcaac ----- cgaggagtgtataaggagtgacggggacacgcaaatcgaggatcgcaac
Contig clone clone E rev clone E forw	20549 615 946	aagacgcaagacgagttgaaatgacatctcggcaactactctgcagatgg ----- -----	Contig clone clone E rev clone E forw	21393 615 546	agtgttgaacgctaacacacatcagacatccgagtaattgaaatagcaa ----- agtgttgaacgctaacacacatcagacatccgagtaattgaaatagcaa
Contig clone clone E rev clone E forw	20599 615 946	ctggagcaacgcgttctgctgtaggtgtaagaaaatcctctgttgc ----- -----	Contig clone clone E rev clone E forw	21443 615 496	aaactaacacaagaagtaaaaggaggccttataatgtaacatgtaaa ----- aacataacacaagaagtaaaaggaggccttataatgtaacatgtaaa
Contig clone clone E rev clone E forw	20649 615 946	aggagagagataggagtttttaggcctaaaaaggaaccgtaaccggctgc ----- -----	Contig clone clone E rev clone E forw	21493 615 446	catgatgtgtatgtatcagtaacaaaaagagaacagaacaaacca ----- catgatgtgtatgtatcagtaacaaaaagagaacagaacaaacca
Contig clone clone E rev clone E forw	20699 615 946	taacagagcccgatcctgaccgaatgatcccatcctcggacggttctct ----- -----catcattg-----	Contig clone clone E rev clone E forw	21543 615 396	cgaaccactataatgataacgtacgtctctccttcaaggacgatta ----- cgaaccactataatgataatgtacgtctctccttcaaggacgatta
Contig clone clone E rev clone E forw	20749 615 938	gctgtcgtctatattccatacagcgtcaaccttggggcagcagctgta ----- -----	Contig clone clone E rev clone E forw	21593 615 346	gacagtaacaaaaacaacaaacaaagcattgaattgggacgcgatcat ----- gacagtaacaaaaacaacaaacaaagcattgaattgggacgcgatcat
Contig clone clone E rev clone E forw	20799 615 938	gatcatggacacgatcgggagcgggaaatggagtgcaacagtgacagtt ----- -----	Contig clone clone E rev clone E forw	21643 615 296	tagagcagatgtagatggaacttcgatcaaacgtaaaaaaa-ctagta ----- tagagcagatgtagatggaacttcgatcaaacgtaaaaaaaactagta
Contig clone clone E rev clone E forw	20849 615 938	gaatgttgggtgtagctgtaaggcatatagatgtataacgataccaat ----- -----	Contig clone clone E rev clone E forw	21692 615 246	agcaacattaacaatttattagtcgtaattgggagcagaaaaacctgt ----- agcaacattaacaatttattagtcgtaattgggagcagaaaaacctgt
Contig clone clone E rev clone E forw	20899 615 938	acaatacaaaaaggaccaggtctcttggagggtgctcggctcggcgca ----- -----	Contig clone clone E rev clone E forw	21742 615 196	tcgcgtagacgtaagacaagataactatcgtagtgagagaacgatag ----- tcgcgtagacactaagacaagataactatcgtagtgagagaactatag
Contig clone clone E rev clone E forw	20949 615 938	gcaccaacaatcccgtggtgccgctggaggagtagctgttaaacatc ----- -----	Contig clone clone E rev clone E forw	21792 615 146	agagaaaaaggagagaaagagagaaggtggttgaaacgaataaaagat ----- agagagaaaaaggagagaaagagagaaggtggttgaaacgaataaaagat
Contig clone clone E rev clone E forw	20999 615 938	attgttaagctattggaactctgacaggaacaaccaagaggacagcgc ----- -----taagctatt-gaactctgacagg-acaaccaagaggacagcgc	Contig clone clone E rev clone E forw	21842 615 96	aaaattataaaagggttagctcgtcgtctaaaagcaactagtagctaa ----- aaaattataaaagggttagctcgtcgtctaaaagcaactagtagctaa
Contig clone clone E rev clone E forw	21049 615 896	gctagtgtagctgtaagaccgctccttcccataaccgttgatgtgt ----- gctagtgtagctgtaagaccgctccttcccataaccgttgatgtgt	Contig clone clone E rev clone E forw	21892 615 46	acacgacagatttagtagtgaagaaatgaacaaaaactataaatta ----- acacgatagatttagtagtgaagaa-----

## Discussion

Characterising midgut molecules involved in pathogen-mosquito interactions may help in developing new methods of controlling diseases transmitted by mosquitoes, e.g. by impairing vector competence [10] as achieved experimentally for *An. stephensi* through transgenesis [11]. The midgut proteins interacting with malaria parasites are likely to be located in the posterior midgut which is where the blood meal is digested and parasite development and invasion occurs. The midgut-specific genes from *An. gambiae* characterised so far include those encoding for structural and digestive proteins [12,13], immune response genes of *An. gambiae* that are activated during midgut invasion by ookinetes [8] as well as genes for defensive proteins such as cecropin [14] and defensin [15] that are expressed in the anterior midgut. A cell surface mucin specifically expressed in the midgut of *An. gambiae* has been characterised by screening a cDNA library of *An. gambiae* midgut with an antiserum against female *An. gambiae* peritrophic membrane proteins [13].

TRP cation channel protein in *Drosophila* has been detected in photoreceptors and nerve cell axons [16]. A human analogue has been reported in hepatocytes [17]. More recently a TRP cation channel protein has been identified as having a role in calcium signalling and fluid transport in the *Drosophila* Malpighian tubule epithelium [18]. The related *Anopheles* protein detected here could be a membrane glycoprotein cation transporter present on the luminal surface of the midgut cells, although this remains to be confirmed in expression studies. Implication of the gene in the interaction between mosquito and pathogen can be addressed by generating specific antibody against this gene and testing for invasion inhibition or interference RNA (RNAi) mediated gene silencing and subsequent *Plasmodium* infection or in vitro interaction assays between recombinant protein and *Plasmodium*. Since ingestion of the antiserum to midgut glycoproteins reduces infectivity of malaria parasites to *An. tessellatus* [6], proteins such as the TRP cation channel, and the cell surface mucin [8] warrant further investigation as potential targets for transmission blocking vaccines and other methods for interfering with malaria transmission.

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# More than patient care: The community medicine attachment and community follow-up models

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## Abstract

The Community Medicine Attachment (CMA) and the Community Follow-Up Project (CFUP) have been incorporated into fourth year medical students' training as part of ensuring that medical doctors trained by Universiti Putra Malaysia will understand their role within the social and cultural context in which they work. Both models illustrate the relevance of humanities in understanding illness and medical care. Over the last five years of their implementation at Universiti Putra Malaysia, definite progress and benefits have been seen. Further potential, especially in the area of research, will depend on strengthening the mechanism of supervising and collaborating with the relevant professionals within the health sector and outside academia.

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## Introduction

Two models adopted under the undergraduate medical program implemented at the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Serdang, Selangor are presented here. The aim is to illustrate that medical education incorporates both medical science and social science disciplines with the purpose of equipping students with the understanding of the multi-factorial nature of disease and illness. While the Community Medicine Attachment (CMA) is carried out in villages and suburban settings, the Community Follow-Up Project (CFUP) is carried out within the household environment of patients in urban areas. Of the two models, the CMA was the first program to be implemented. Differing in their emphasis and goals, the CMA directs its focus on community survey, community involvement, and community intervention, while the CFUP concentrates on the impact of chronic illnesses on the patients and their families and linking the patients with other social support

agencies in the community. Students' competence are measured through their oral presentations and written reports, which are reviewed by the faculty staff and district's health professionals.

## Changing learning objectives in medical education

Medical training is basically designed for the purpose of acquiring knowledge about health and disease and practicing it as a science. Hence, medical education is essentially about teaching methods of recognizing disease and illness and finding their cure. In short, students are taught how to explain a medical phenomenon. Finding out about an illness or disease in a clinic setting is, in most instances, an attempt by the doctor to know the patient's condition by offering him or her with statements about what might be 'wrong' with his or her condition. Very seldom would the doctor be interested to know more about the patient's own explanation. With the medical knowledge that has been acquired medical doctors would soon assume the task of diagnosing their patient's illness based on physical examination for clinical signs and symptoms.

Societies increasingly expect that more efficient and effective medical care exist. In response to concerns that new doctors are not well prepared for these, existing learning objectives in medical education have to be

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reviewed. Apart from their main task of curing disease and promoting health of individuals and populations, doctors “must understand the economic, psychological, occupational, social and cultural factors that contribute to the development and/or perpetuation of conditions that impair health” [1].

In reality, health and disease can be explained from different perspectives, depending at what level one is situated. Although the clinical level is the most appropriate and deemed to be ‘true’, it may give rise to conflicting views since different interpretations are involved. The different levels, upon which the interpretations take place, are in actuality, not conflicting, but have to be reconciled. This is where the approach of having medical students exposed to the patient’s explanation of his or her illness and how this bears on his family relationship and social interaction gets into context [2]. On a wider scale, disease and illness are given different explanations by groups according to their belief and cultural system.

Undeniably, medical knowledge is concerned with studying human beings from a vast and varied range of perspectives. It is to be recognized that any aspect that deals with human existence has to consider “the interface between the individual and society”, henceforth, the behavioral dimensions of patients and their social interactions [3]. Modern medicine has long evolved from its ancient origin that dwell much on metaphysical domains toward a more rigorous scientific based inquiry while allowing a more encompassing humanistic approach.

### **Adopting the humanistic approach in medical education at Universiti Putra Malaysia**

Compared to other public medical schools in Malaysia, Universiti Putra Malaysia’s (UPM) medical faculty was only recently established, i.e. in 1996. It took pride in itself when its first batch of 40 students made their way to convocation day in 2001. It is now entering into its tenth year, and obviously there lies ahead many challenges. In many ways it has benefited from the experiences of medical schools of older universities such as Universiti Malaya (UM) and Universiti Kebangsaan Malaysia (UKM).

### **The community medicine attachment**

In realizing that Malaysia is composed of various ethnic groups it was therefore intended that medical education had to give due importance to the different cultural norms and values as manifested in patients’ attitude and behavior. The Community Medicine Attachment was incorporated into students’ training during their fourth year. Known initially as District Health Posting in 1999, it was later renamed the Community Medicine Attachment in 2002. Departing somewhat from a model designed by the University of Nottingham, the Community Medicine Attachment model of UPM had as its focus developing the students for their role in community setting wherein the health care system operates at two levels, i.e. primary and secondary. Differing somewhat from that practiced by the Universiti Kebangsaan Malaysia Medical School which sent its students to the rural areas for eight weeks, that adopted by Universiti Putra Malaysia, would place its fourth-year medical students for six weeks in a district, usually more than 200 km away from the campus. Students then have to perform multiple tasks at three different places, namely the District Hospital, the District Health Office and the Health Clinic. Although their placement at these institutions will have been prearranged, students cannot hope that everything would run smoothly. During initial briefings prior to their assignment to the ‘field’ they would have been told to expect the unexpected, and if it occurred they would have to draw on their intellectual training to resolve the problems at hand.

As the change to the program name implies, the Community Medicine Attachment entails activities that are community-based. Through their undertakings of a community health survey, students are made to appreciate the importance of social, economic, cultural, and political factors on the health status of individuals and groups. Working under the supervision of the faculty staff and health professionals at the districts they are attached to, they are given broad areas of public health concerns such as the prevalence of cardiovascular diseases, dengue infections, obesity, and the well being of older persons in the community. They then have to discuss among themselves and with guidance from the academic supervisor choose a

more specific topic to suit the community posting period and other tasks at hand.

To facilitate the process, groups of between 10-12 students are assigned to two areas in the district. Their primary learning objectives are to understand the organizational structure of district hospital, health clinic, and the various public health programs that are being implemented, such as the environmental health program. The other component of their assignment is to understand the role and functions of various categories of health staff within each organization.

### **The community follow-up project**

The Community Follow-Up Project, on the other hand, developed out of the need to prepare students to link their patients' clinical condition to their psychological, family, social and cultural situations. It was first developed in 2001 with the aim of strengthening the students' clinical skills [4]. Over a period of six months, a group of between 4 to 5 students would visit patients while in the ward, and subsequently in their homes after discharge. No specific limit is set on how much should the students cover on their patients' situation as they recuperate at home. A lot depends on their time and willingness to do what they feel should be gathered.

To enable the students to explore a wide range of influencing factors and how these affect each patient and his/her family, they are asked to select patients with chronic illness, such as congenital disease, asthma, schizophrenia, and major depression, or those terminally ill such as cancer or acquired immunodeficiency syndrome. While students record and observe their patients' medical history and clinical conditions during visits to the wards, they are to elicit from the patients their own understanding of the illness. These constitute qualitative data of relevance needed for assessing the patients' progress or digress. In addition, the frequent visits and communication with each patient set the formation of closer rapport between students and patients. Once established, it is easier for students to visit their patients in their homes after release from the hospital.

### **The underlying premise of community-based and family-centered models**

Both of the above-mentioned models have been designed using the premise that health care goes beyond disease diagnosis and treatment. The sooner students come to realize this the better it is for them to perform their roles upon completion of their undergraduate study. It is therefore imperative that they are made to understand the role of individuals within the family as the basic social group and the wider society where other social and cultural influences will come into play.

Under CFUP students begin to get exposed to the family situation when they follow-up patients to their homes soon after discharge. The prime concern is to find out from the individuals and their family members how chronic illnesses are impacting on their lives and those who are related to them. Attention is given to several areas of the patient's present situation – attitude and coping strategies, family behavior in relation to the sick individual, and living environment. Theoretically, the home visit is to enable students to get a framework of how the patient fits in or adjust to the home situation. In practical terms, what the students are supposed to analyze is the individual within the given factors that surround him. No hard rules are laid down on how this is to be done. It suffices so long as the students feel that what they gather is useful. The ultimate aim is to help patients onto better roads to recovery through 'diagnostic' and 'intervention' methods.

In a similar vein, the Community Survey, which is part of the Community Medicine Attachment, is started with the process of identifying specific public health problem of importance to the district where students are attached [5]. Over the last four years specific health problems have been chosen. These include dengue, mental health, adolescent health, and health of the elderly. Prior to the actual survey, lectures on how to do a community survey would be given at the study site. As the time for them to complete the task is very short, it is therefore expected that students would have done much of the literature search before leaving the faculty in Serdang. In six weeks they have to prepare, write and present their research proposal

to a panel of supervisors, conduct the survey, and plan and implement an intervention program based on the study's findings. Throughout the planning and implementation period they are to work closely with the district's health officer and staff and with the village committee. They also have to recognize the role of political figures in the district. In short, their research activity will lead them to realize of who in the community should be involved in health and how can they be mobilized.

### **The importance of communication skills**

Any learning objective can only be achieved if both educators and learners can communicate effectively. For the to-be doctors, they need to know the importance of communicating well, particularly in view of the fact they will be working among patients from various cultural and language background. As asserted by the Association of American Medical Colleges, "Physicians must be able to communicate with patients and patients' families about all of their concerns regarding the patients' health and well-being". In patient care, effective communication is the foundation for an educational process and for compliance to medication to take place. Becoming a doctor is more than just learning about the anatomy of the body and their functions and what drugs can do in the restoration of biological processes. Doctors are trained to acquire knowledge, skills and attitudes in three broad areas – individuals, groups and societies; communications and consultations skills; and ethical values affecting both patients and clinical practice [6]. Quite understandably, when doctors talk to their patients during medical visits, more than words are involved. In communication, "...the whole repertoire of nonverbal expressions and cues are involved, which include "The smiles and head nods of recognition, the grimaces of pain, the high-pitched voice of anxiety all give context and enhanced meaning to the words spoken" [7].

Talking to the patients is not solely meant for understanding their thoughts and attitudes; it also serves as an avenue for students to learn about relationships that are appropriate between students and patients. Students

are at the bottom most layer in the hierarchy of a complex relationship existing in the medical care setting. The power is always with someone above them. It is during visits to patients that "even students hold a certain amount of power" [8].

Aspects of communication are of paramount importance in the delivery of quality health care. In view of the rapidly changing social and cultural landscape brought about partly by the Internet, more should be known about medical consultations. Students have thus to appreciate that there are a multitude of factors that surround and influence communication. In the CFUP, students are trained by evaluating their communication skills in three primary areas. These are (i) communication that takes place between the patient and the hospital or health care workers (ii) understanding of patient's illness and management, and (iii) communication between the various levels – primary, secondary and tertiary care.

While evaluating their communicative skill students are to realize that the various influences such as the patient's socioeconomic background (e.g. gender difference), and patient's communicative style will not act independently of each other. By being involved in the different encounters and levels of communication students will eventually understand the multitude of factors that need to be considered in doctor-patient and patient-doctor communication. Basic understanding of an ecological perspective in communication could lead students to further understanding of the role and importance of communication in medical practice.

### **Getting to understand health and illness in the community**

The community survey is an attempt to make students find out for themselves what the health problems in a community are. Given the task of determining a public health problem they would have to carry out preliminary studies before identifying the problem to be investigated. However, as their time in the community is limited to six weeks, the task is made simpler for them. Prior to their going to the district, they would meet the District's



Medical Officer of Health. They would then be informed of the community health problem and subsequently they would have to begin the community survey and plan for the health intervention.

Having the broad area of research such as Dengue and Its Control, or Adolescents Health, would only be the beginning of the CMA. Students have to follow specific steps as required of them toward implementation and completion of their survey.

In further defining their research problem, students have to provide evidence of why a specific research should be done. Using a literature review, they would provide recent studies indicating two scenarios, the global and the local context of the problem. Having done that, they would decide on the methodology that would consider the type of research, whether it is cross-sectional or cohort studies. An essential part of their proposal is the description of the population to be studied and the sample to be selected. Subsequently, they would provide the methods of data collection and data analysis.

Key steps in the research process are (i) writing up a research proposal (ii) Implementing the study (planning and executing the data collection) (iii) analyzing the data to indicate associations or relationships among factors, and making conclusions. Before leaving the study site the groups have to plan and carry out an intervention program. The program is based on their study findings. Using a Community Diagnosis as basis for the intervention, they then proceed to prepare for a Health Intervention Day.

### **Assessing patients chronic condition on their social, cultural and psychological lives**

An essential component of the CFUP is the home visit. The key focus of each visit is on the patient's progress since discharge. Of particular importance is whether the patient is adjusting well to the home situation in relation to the illness. Is he or she coping well in terms of having a positive attitude toward him/herself. Is he/she experiencing pain and feeling uneasy about it. In short students have to ask and observe any emotional or psychological disturbance.

An illness may not be physically seen; rather it is expressed in words and in behavior. Beyond the individual, the visit is to determine what impact does the patient's illness has on the family relationship. A chronic illness is long-term in nature. An individual living with family members would no doubt create new or modified relationships between the sick person and those related to him or her.

A chronic illness is a fine example for students to determine its impact on various aspects and levels of the patients' lives. Firstly, the chronic nature of the illness will impose great limitations in terms of physical activities. The degree of limitations however, would depend on how the sick person views his/her condition. And this depends on gender, age, cultural expectations and nature of impairment.

For learning purposes, students are asked to select patients from a low to moderate socioeconomic levels. The rationale is for students to be able to determine as many spheres of the patients' lives that can be affected by their illness.

Apart from having the students observe and note the change that takes place in the patient and others around him/her, the CFUP is to enable students to determine how departments or agencies other than health can help to reduce the burden of the individual. The Social Welfare Department, for instance, can be referred to in matters of financial support.

### **Progress and future prospects**

#### *The Community Survey and Health Intervention Program*

Three faculty members, who act as field supervisors, supervise each group of students. The groups' first task is to prepare and write up a research proposal. But prior to that adequate lecture on research design and questionnaire development will be given to all groups while they are in the district.

Major constraints of the CMA are time and funding. Obviously, one week is far from adequate to conduct a

proper community survey. Hardly any time is available for preliminary data gathering on the social, economic, and cultural background of the community. Students have to resort to information given by the District Health Office pertaining to geographical location, ethnic composition, occupational pattern, and type of residence. Some useful information on accessibility to health facilities means of transportation, and basic amenities can also be gathered informally. The constraint due to limited funds can hinder students from exploiting various strategies in the intervention activities.

The emphasis of research has largely been on quantitative data gathering. This is mainly because students are expected to gain and test their knowledge in epidemiological research. Therefore aspects of methods of sampling, and quantitative data analysis are given prominence in their second and fourth year education. Variables that are qualitative in nature such as those that relate to opinion, feelings, and emotions, are recognized but hardly considered seriously in the methodology. Again, the limitation is imposed by time.

Despite the constraints, students find their experience in community research rewarding. They gain substantially in terms of identifying a problem and getting to deal with a real situation. For the academic staffs that supervise them on their visits to the various health institutions and community leaders, each experience adds to their existing knowledge and skills. Most importantly, the Community Medicine Attachment opens wider windows to the social world of communities of which the health professionals are part. Every field research no matter how localized it is has potential of being turned into large-scale research projects to be undertaken by the district health offices or the students when later they have the chance of returning to the area.

#### *The Home Visit*

Based on students' evaluation of the CFUP, it is found that the Home Visit component is the most beneficial to them. In connection to this, they find communication skills to be a very crucial element in understanding the patients,

their family and careers. They also realize the role of other government and non-government agencies in the patient's recovery process. By involving other sectors that can lend support to the patients' dilemmas, students begin to appreciate the importance of networking among various individuals and groups in society. In short, the home visit is a path toward a comprehensive medical care.

The home visits also provide opportunities for both students and staffs to determine what aspects of the patient's life are critical. Students will soon realize that it takes more than the individual's psychological factor to be able to continue with treatment and with life. The strength to cope and live with a chronic illness is partly dependent on family support. As has been shown in many related studies on the role and experience of caregivers, this topic has immediate and future relevance for both students and those involved in the teaching and linking with the project. Not only patients can be studied but also caregivers can be made the focus, especially of qualitative research.

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