Proceedings of

CERTIFICATE COURSE IN CORONARY ARTERY DISEASE AND CARDIAC REHABILITATION 96

HONG KONG CONVENTION & EXHIBITION CENTRE

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Proceedings on

Certificate Course in Coronary Artery Disease and Cardiac Rehabilitation 96

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Preface

The Certificate Course in Coronary Artery Disease and Cardiac Rehabilitation 96 is the result of the remarkable collaborative effort among different parties with keen interest and active participation in cardiac rehabilitation. We are especially delighted to see that this course, like the one held last years, have generated immense interest and contribution to the development in this relatively new concept locally. Indeed, over 650 applicants have registered for the course which was meant only for 500 participants, and we have only been able to accept one third of the applicants to the workshops.

The course is designed to provide knowledge and information concerning the latest development on various aspects of cardiac rehabilitation. To name but a few, topics covered include life style management, exercise and stress management. In addition to the forum on the local development of cardiac rehabilitation, we have provided dialectic course on the management of coronary artery disease and lipid disorder. The role of exercise in heart disease is a central theme of this course, and will be presented by local and international experts. The workshop gives a practical approach to professionals directly involved in cardiac rehabilitation. We had compiled the content of this course into proceeding for further reference. We are greatly indebted to all the contributors who have contributed excellent materials within the tight schedule.

We are grateful for the support given to us by Dr. E.K. Yeoh, Chief Executive, the Hospital Authority. The enthusiastic efforts we received from many of our friend, colleagues who have participated at various stages of organisation of the course are also gratefully acknowledged.

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Opening Address

Dr. E.K. Yeoh, JP
Chief Executive, Hospital Authority

Dear Dr. C.P. Lau, Dr. S.T. Lau, Organising Committee Members, Distinguished Guests and Colleagues,

I am very delighted to be able to make the opening address of the Certificate Course in Coronary Artery Disease and Cardiac Rehabilitation 96. This is the second time the program is being organised, following the overwhelming success of last year's program. The Hospital Authority has great pleasure in joining hands with the Department of Medicine, University of Hong Kong, Princess Margaret Hospital and the Hong Kong Society for Rehabilitation Community Rehabilitation Network to co-organise this meaningful event.

Heart disease accounts for 17% of deaths in Hong Kong and is the second leading cause of death in Hong Kong. In view of its growing prevalence in the territory and impact on the death of the community, the Authority has identified Ischemic Heart Disease as one of its 10 priority health areas which need to be addressed.

Managing Ischemic Heart Disease patients during the acute phase of their illness is a complex task requiring considerable expertise-technology-intensive input and good management to co-ordinate and organise care. after the acute phase, structured rehabilitation program to assist physical and psychological recovery of patients is important. To address this, collaboration between medical institution and community organisation is a key to success .

The World Health Organisation (WHO) has developed policies suggesting that secondary prevention and rehabilitation should be established and made available to all patients with heart disease. Moving towards this target and in accordance with the fundamental philosophy of the Hospital Authority on providing " patient-centred care" service , cardiac rehabilitation is being developed, as a process concerned with patient's physical, mental, social and vocational rehabilitation, designed to restore the patient to an optimally productive, active and satisfying life as soon as possible after the detection of heart disease. In order to achieve this aim, a multi-disciplinary input is required.

This is an excellent opportunity for health care colleagues to share experience and learn from each other. It is also our privilege to have both local and overseas experts participating in the program. In particular, I would like to welcome and thank the three specialists from the States. Professor Froelicher, Professor Franklin and Ms. Quaglietti for accepting our invitation to contribute to this program. Their wealth of knowledge, extensive experience and multitude of skills will provide invaluable input to assist and enable all participants to improve the quality of care of cardiac patients.

I would also like to express my gratitude to the organizers whose contribution does extend beyond this program. Their strong commitment and contributions in advocating and promoting the cardiac rehabilitation. are very much appreciated. Lastly, I would like to wish all of you have a stimulating and fruitful interchange in the forthcoming days, and wish our overseas guests, an enjoyable stay in Hong Kong.

Forum

Prevalence of Coronary Artery Disease in Hong Kong

PREVALENCE OF CORONARY ARTERY DISEASE IN HONG KONG

Kam-Sang Woo

Introduction

For many years, coronary artery disease has been the top killer in the western affluent countries [1]. Each year, 200-600 per 100,000 people die of this disease process. The corresponding information on the occurrence of coronary artery disease in the Chinese communities, is comparatively scanty. The purpose of the present report is to review specifically the occurrence of coronary artery disease in the Chinese in Hong Kong.

Patients and Methods

The occurrence of coronary arterial disease in Hong Kong was assessed by a multifaceted approach. This consisted of the evaluation and review of the prevalence of such disease in hospitals and among the general population, along with the incidence of coronary deaths and of acute myocardial infarction in Hong Kong. The vital statistics were reviewed from the annual reports of the Medical and Health Services Department for total population data (all ages and both sexes combined 1969-1985). Data tapes from the Census and Statistics Department were analyzed for data specific for age and sex (1961-1984).

Results

In the past 20 years, mortality from coronary arterial disease has increased markedly from 15.5 to 44.4 per 100,000 population, and in those older than 40 years of age, from 99.1 to 148.7 per 100,000. The increase, however, was in the early 1970's, and both the crude death rate and the death rate at ages over 40 have changed little in the past 10 years. Moreover, the age specific mortality rates have not increased throughout this period (Table 1 & 2 Figure 1). The rates were higher in men than in women, being very low in males below 44 years of age, around 130-200 per 100,000 males in the age range of 55-64 years, and 900-1400 per 100,000 males above 75 years of age. The sex difference was not as great as in Western countries.

From published vital statistics, the incidence (total hospital admissions) of acute myocardial infarction from 1979 to 1986 was in the range of 90.8-117.3 per 100,000 population older than 40 years, with total deaths from acute myocardial infarction in the range of 57.6-87.8 per year per 100,000 population older than 40 years (Table 3). The age specific mortality rates for acute myocardial infarction were twice as high in males as in females at all ages, and for both sexes the incidence was markedly higher in people above 55 years of age (Table 4, Fig. 2).

The overall proportion of coronary artery disease amongst hospital in-patients has increased from 4.2 to 9.6 per 1000 inmates, and from 16 to 28.2 per 1000 medical admissions (Table 5). A survey conducted in the medical units of the Queen Elizabeth Hospital and Prince of Wales Hospital also revealed the same increase from 12.2 to 38.5% of adult cardiac admission (Table 6).

Dicussion

The incidence of coronary arterial disease in Hong Kong is much lower than among their western counterparts. Of the various facets of coronary incidence, the annual coronary mortality is roughly one-sixth, the incidence of acute myocardial infarction one-eighth to one-tenth, and mortality from acute myocardial infarction is roughly one-eighth of the western figures. The true prevalence of coronary arterial disease among the general population may not easily be identified. On the whole, its prevalence of 3-7% in the Chinese is roughly one-quarter of the Caucasian counterparts. The result of a territory-wide registry of acute myocardail infarction in Hong Kong is awaited.

The lower incidence of coronary artery disease in the Chinese in Hong Kong is similar to that reported in Japan and many other parts of Asia [2, 3]. A report from Singapore in 1975 revealed a lower incidence of acute myocardial infarction in the Chinese compared with that in the Indians and Malaysians [4]. Presumably some ethnic factors, including diet and life habits, could be contributory.

While there is a common tendency of declining incidence of coronary mortality in the United States of America, Australia, Finland and possibly also in the United Kingdom, no such trend is witnessed in the Chinese communities [5-11]. On the contrary, an increasing incidence is identified by all practitioners in Beijing, Tianjin, Shanghai, Taiwan and Hong Kong. The present paper is unique in that we were able to evaluate the impact of aging on increasing prevalence of coronary artery disease in Hong Kong by comparing the age specific mortality rates of coronary arterial disease and acute myocardial infarciton in Hong Kong over the past 20 years. These appear to be fairly constant, suggesting that the apparent increase in incidence in Hong Kong is predominantly the result of aging of our population. On the other hand, the static incidence within each age group would also imply the failure of control of coronary risk factors on the community level in Hong Kong.

The size of the total Chinese population at risk is large. With the continued aging of the Chinese communities, now still predominantly young, we are expecting a bigger problem from coronary artery disease in the coming decades.

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Mortality rates of ischaemic heart disease in Hong Kong (1961–1984); males (3-year moving average rates per 100,000 population).

Year	Age (years)						Total
	25–34	35–44	45–54	55–64	65–74	75+	
1961	2.8	11.8	43.9	175.2	416.8	926.4	24.5
1962	2.4	11.5	44.3	188.6	401.5	890.6	24.9
1963	2.5	12.8	47.0	201.3	415.7	972.7	27.3
1964	2.2	12.9	49.8	201.4	492.2	1125.5	30.6
1965	2.8	12.4	47.4	179.8	551.8	1344.3	32.7
1966	3.1	10.4	41.8	159.8	570.6	1423.3	33.0
1967	2.4	7.1	39.4	156.9	531.2	1410.2	32.3
1968	1.3	5.4	34.2	140.2	427.8	1144.3	26.6
1969	0.6	4.2	31.8	132.3	357.1	961.0	24.9
1970	0.6	5.0	31.0	121.9	337.8	821.9	24.1
1971	1.0	5.2	32.9	130.1	396.9	954.9	27.9
1972	1.5	5.6	36.1	122.9	387.2	975.5	29.0
1973	1.4	5.6	34.2	121.8	373.3	975.6	29.5
1974	0.9	5.4	35.3	118.8	360.3	895.5	29.8
1975	0.9	5.6	32.3	128.0	399.1	912.0	32.5
1976	1.5	7.1	34.8	135.5	425.1	938.6	36.0
1977	1.8	8.1	37.7	146.1	434.3	965.8	38.9
1978	1.8	9.2	39.9	153.7	432.3	1022.5	41.4
1979	1.6	9.4	38.3	147.6	440.4	1055.5	42.0
1980	1.7	8.8	37.2	142.4	440.2	1046.3	42.8
1981	1.3	7.8	35.7	130.4	420.9	1022.5	42.8
1982	1.1	5.8	34.1	134.5	409.0	981.2	44.2
1983	0.9	5.8	31.5	130.6	403.2	963.6	44.8
1984	0.8	4.8	28.8	132.9	402.8	908.9	44.8

TABLE 1

Mortality rates of ischaemic heart disease in Hong Kong (1961–1984); females (3-year moving average rates per 100,000 population).

Year	Age (years)						Total
	25–34	35–44	45–54	55–64	65–74	75+	
1961	1.4	2.9	14.3	70.2	196.6	639.3	20.1
1962	1.2	3.1	13.8	70.9	194.6	603.9	19.9
1963	1.0	1.7	15.3	65.3	204.6	644.8	21.0
1964	0.6	2.7	17.1	66.2	216.6	718.9	23.5
1965	0.3	3.0	19.8	65.6	232.6	853.6	27.0
1966	0.3	4.1	20.3	63.1	238.6	881.9	28.8
1967	0.8	3.4	18.6	63.4	226.8	866.1	28.8
1968	1.2	2.7	13.3	50.2	179.1	667.5	23.1
1969	0.8	2.4	10.2	50.6	155.1	578.5	21.2
1970	1.0	2.8	11.5	45.4	158.8	544.3	21.6
1971	1.1	3.1	14.5	55.2	185.6	657.3	26.6
1972	1.4	3.1	16.0	55.2	184.9	657.0	27.8
1973	0.7	2.6	15.8	57.7	182.8	643.5	28.6
1974	0.6	2.4	14.6	56.3	187.1	594.1	28.6
1975	0.4	2.2	12.9	54.4	200.7	596.4	29.5
1976	0.7	2.8	11.2	55.8	202.5	655.5	31.8
1977	0.5	2.7	12.2	60.1	218.4	707.2	35.0
1978	0.4	2.7	12.4	64.3	225.6	751.8	37.9
1979	0.3	2.5	13.2	65.3	238.4	711.0	38.5
1980	0.9	2.6	13.2	61.8	233.1	729.4	39.4
1981	1.1	2.2	14.0	62.1	227.1	726.2	39.9
1982	0.9	1.2	14.5	63.8	217.4	754.5	41.3
1983	0.5	0.8	13.2	62.7	216.4	723.7	41.2
1984	0.2	0.8	12.3	62.6	213.1	714.1	41.4

TABLE 2

Incidence of acute myocardial infarction (AMI) in Hong Kong (1979–86).

Year	Population in Hong Kong		%	AMI		
	Total (P1)	> 40 years (P2)		Total	Per 100,000 (P1)	Per 100,000 (P2)
1979	4,878,600	1,435,500	29.4	1599	32.8	111.4
				(847)	(17.4)	(59.0)
1980	5,038,500	1,502,600	29.8	1365	27.1	90.8
				(865)	(17.2)	(57.6)
1981	5,154,100	1,538,400	29.8	1415	27.5	92.0
				(976)	(18.9)	(63.4)
1982	5,232,900	1,564,600	29.9	1497	28.6	95.7
				(1096)	(20.9)	(70.0)
1983	5,313,200	1,587,900	29.9	1806	44.0	117.3
				(1325)	(24.9)	(83.4)
1984	5,364,000	1,607,600	30.0	1720	32.1	107.0
				(1202)	(22.4)	(74.8)
1985	5,422,800	1,636,300	30.2	1640	30.2	100.2
				(1321)	(24.4)	(80.7)
1986	5,532,600	1,681,800	30.4	1723	31.1	102.4
				(1476)	(36.7)	(87.8)

AMI mortalities in parentheses.

TABLE 3

Mortality from acute myocardial infarction in Hong Kong 1978–1986; 3 year moving average rates per 100,000 population.

	Age (years)						
	15–24	25–34	35–44	45–54	55–64	65–74	75+
Males							
1978			4	18	78	162	301
1979		1.0	6	21	72	225	445
1980		0.6	6	15	67	204	407
1981	0.3	0.8	4	23	69	179	421
1982		1.0	5	26	69	225	426
1983		1.0	3	23	95	253	484
1984	0.2	0.4	5	22	82	228	396
1985	0.2	0.2	4	29	88	236	422
1986		0.1	7	26	91	238	548
Females							
1978			1.0	6	35	89	205
1979			1.0	4	25	94	236
1980		0.3	0.9	6	31	110	234
1981	0.2	1.2	0.9	9	36	102	269
1982		0.5	1.0	10	37	100	283
1983			1.0	11	46	117	343
1984		0.2	1.1	5	31	104	283
1985	0.2	0.6	1.1	10	38	128	279
1986		0.7	0.6	9	34	146	267

TABLE 4

Ischaemic heart disease in Queen Elizabeth Hospital (Medical Unit B) and Prince of Wales Hospital *

Year	Total M.P.	Total C.P.	Ischaemic heart disease		
			Total	% M.P.	% C.P.
1969	–	596	73	–	12.2
1971	6828	802	121	1.8	15.0
1973	9171	910	149	1.6	16.4
1977	12357	1039	193	1.6	19.0
1979	13120	1286	218	1.7	15.7
1984–85 *	10777	910	256	2.4	28.1
1986–87 *	10747	1649	635	5.9	38.5

M.P. = medical patients; C.P. = cardiac patients.

TABLE 6

Prevalence of ischaemic heart disease in Hong Kong.

Year	H.P.	M.P.	Ischaemic heart disease		
			Total	Per 1000 H.P.	Per 1000 M.P.
1969	257466	65256	1076	4.2	16
1971	284062	64111	1566	5.5	24
1973	346320	118858	2025	5.8	17
1975	400182	133998	2630	6.6	20
1977	453301	151621	3317	7.3	22
1979	631196	199471	5302	8.4	26.6
1981	692017	216290	5791	8.4	26.8
1983	793102	265588	7208	9.6	28.2
1985	786238	266982	7095	9.0	26.6

H.P. = hospital patients; M.P. = medical patients.

TABLE 5

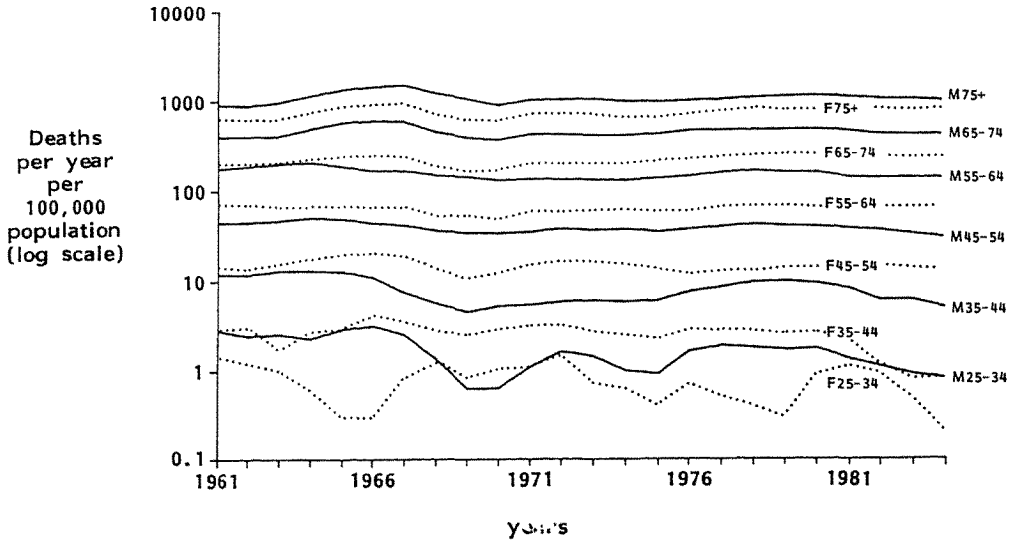

Fig. 1. Ischaemic heart disease mortality in Hong Kong 1961–1984. M25–34 = males aged 25–34 years; F25–34 = females aged 25–34 years, etc.

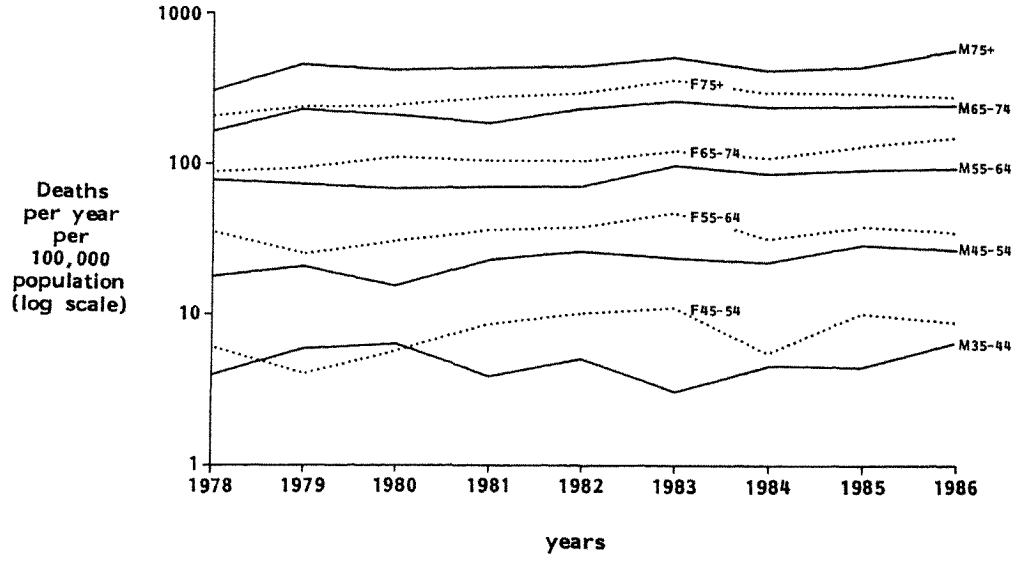

Fig. 2. Acute myocardial infarction mortality in Hong Kong, 1978–1986. The incidence in females aged 35–44 years is approximately 1 per 100,000 throughout. M35–44 = males aged 35–44 years; F45–54 = females aged 45–54 years, etc.

ACUTE MYOCARDIAL INFARCTION REGISTRY OF THE HONG KONG COLLEGE OF CARDIOLOGY

Shou-Pang Wong

In the year 1993, record shows 27.6% of the population died from a circulatory disease.

Of a total of 30,222 deaths, there was 3,138 deaths due to ischemic heart disease of which 1904 had acute myocardial infarction.

It is obvious that coronary heart disease is a major health problem of our community. As the population ages, this will become a more and more important issue in years to come.

Of great significance in the planning of coronary care services is the fact that there are probably 30 to 50 patients with coronary heart disease for each death i.e. an estimation of 100,000 to 150,000 coronary artery disease patients in our population.

This is why there were 15,364 hospital admissions in the year 1993 due to ischemic heart disease.

To better understand the distribution of coronary heart disease in the community and to study the various risk factors that may affect the etiology and outcome of the disease and to better plan on prevention programs, the College of Cardiology established the Acute Myocardial Infarction Registry which was launched in January 1995.

Data of all patients admitted to hospitals with a diagnosis of AMI were collected with information consisting of the demography of the patients, the criteria of diagnosis, presence of risk factors, time delay on arrival to hospital, subsequent management given and the outcome of the hospitalisation. To go one step further, plans are made to contact these patients 1 year afterwards for their condition 1 year after the event.

This is a major undertaking and the College of Cardiology succeeded to obtain the sponsorship of the Health Services Research Fund to conduct the project.

While waiting for the completed collection of data, the preliminary results of information sheets collected so far are analysed in the enclosed report (Appendix 1).

hospitals and we hope that you would also help by contributing your share.

Even though the data may not be completed, many useful information can be derived :

1. 2/3 of AMI patients presented with no previous history of angina with another 10% with a history of angina for less than 1 year.

2. 10.7% had history of previous infarct mostly in the last 2 years.

3. AMI patients admitted to hospitals occurred most frequently (60%) in the age group 60-79.

4. 55% were smokers. 34% had known history of hypertension and 21% were known diabetic patients. Only 5% had family history of IHD.

5. Only 12% patients were known to have history of hypercholesterolemia. This is obviously a falsely low figure indicating the general lack of community awareness of the important relation between hypercholesterolemia and coronary heart disease.

6. 219 patients (23.7%) died, only 77(8.3%) during the first 24 hours and 73 (7.9%) died in the subsequent 4 days. These figures if accurate are unexpected and different from many reported findings and need further analysis and interpretation.

The registry had just begun and many revision and promotion will be done. However, as it is , it has already yielded many useful information for health care policy makers and clinicians to better plan and manage these patients.

Appendix 1 AMI Registry Newsletter December 1995

Appendix

AMI REGISTRY

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Dec., 1995

NEWSLETTER

Introduction of the AMI Registry

The AMI Registry was started on Jan. 1, 1995. This registry aims to establish a data bank to study the demographic characteristic of patient with acute myocardial infarction in Hong Kong. The data will be entered into a Central Registry of Task Force on Cardiovascular Health of the Hong Kong College of Cardiology. The results will be regularly published for the information of the medical community. The research coordination centres are QEH and PWH.

Brief Report

From Jan. 1, 1995 till end of November 1995, AMI Registry had received over 1200 reported cases of AMI patients from 15 HA hospitals and 11 private hospitals. We are very appreciative to all the medical and nursing staff in various hospitals because they have done extra work for filling and collecting the research forms other than their heavy daily workload.
We have scanned 985 part A and 823 part B forms with help from HA statisticians, part A analysis report is done by them, but there is still not analysis program for part B.

Future Panning

AMI Registry had established already for one year. Hoping this research to be more effective. We have re-designed the new part A and part B forms and also contacted the computer consultant to have the analysis program on part B. Now all those things are in final completion stage.

Thank you for all the doctors, nurses and all hospital staffs who have involved in this research, wishing all of you will continue support our research.

Analysis Report of Part A

No. of AMI cases successfully scanned and analyzed from Jan. 1 to Nov. 30, 1995: 985

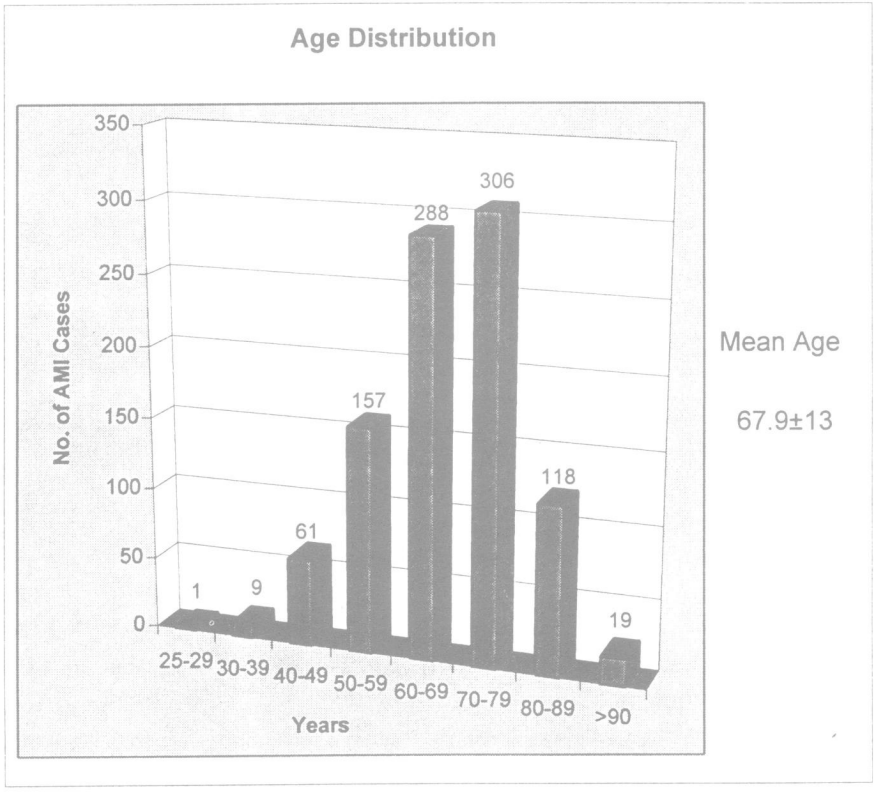
Chinese: 938

Non-Chinese: 39

Mean Heigt (cm): 161.6±10.3

Mean Weight(kg): 60.46±11.31

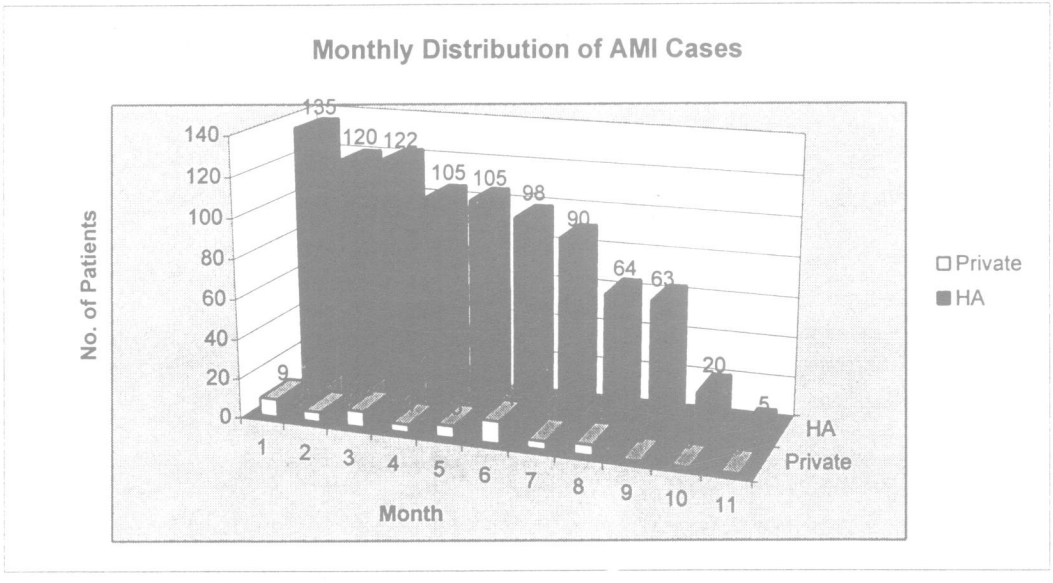
Age group (years)	Cases	
	Number	%
25-29	1	0.1%
30-39	9	0.9%
40-49	61	6.2%
50-59	157	15.9%
60-69	288	29.2%
70-79	306	31.1%
80-89	118	12.0%
>90	19	1.9%
No entry	26	2.6%
Total	985	100%



The Monthly Occurrences of AMI

(Jan. 95 - Nov. 95)

Hospital	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Missing	Total	Rate
Adventist	1	0	1	2	1	2	0	0	0	0	0		0	7	0.7%
Baptist	5	1	2	1	1	4	3	2	0	0	0		0	19	1.9%
Cannosa	0	0	2	0	0	0	0	0	0	0	0		0	2	0.2%
CMC	10	4	10	7	7	10	4	1	0	1	0		0	54	5.5%
Evangel	0	2	1	0	0	1	0	0	0	0	0		0	4	0.4%
KWH	5	9	9	10	12	5	9	5	8	0	0		4	72	7.3%
Maltila	0	0	0	0	0	0	0	0	0	0	0		0	0	0.0%
OLM	2	0	3	1	0	1	0	0	0	0	0		0	7	0.7%
Pr.Blood	0	0	0	0	0	0	0	0	0	0	0		0	0	0.0%
PMH	16	13	17	11	13	13	9	9	7	2	0		0	110	11.2%
POH	11	7	5	7	3	1	0	0	1	0	0		1	36	3.7%
PWH	13	11	14	8	12	5	12	11	13	0	0		0	99	10.1%
PYN	9	15	6	16	12	15	17	8	9	0	0		0	107	10.9%
QEH	20	23	18	10	16	10	12	8	8	5	2		0	132	13.4%
QMH	12	9	5	14	2	10	9	7	6	5	0		1	80	8.1%
RH	11	10	10	3	11	12	3	3	7	2	0		0	72	7.3%
Sanatoriu	1	1	1	0	2	3	1	3	0	0	0		0	12	1.2%
St.Teresa	2	1	1	1	1	0	0	0	0	0	0		0	6	0.6%
TMH	3	6	8	6	2	0	2	5	0	0	0		0	32	3.2%
UCH	17	6	13	8	10	13	6	5	2	5	3		0	88	8.9%
YCH	6	7	4	4	5	3	7	2	1	0	0		0	39	4.0%
St.Pauls's	0	0	0	0	1	1	0	0	0	0	0		0	2	0.2%
GH	0	0	0	0	0	0	0	0	1	0	0		0	1	0.1%
WTS	0	0	0	0	0	0	0	0	0	0	0		0	0	0.0%
Total	144	125	130	109	111	109	94	69	63	20	5		6	985	100%
Private	9	5	8	4	6	11	4	5	0	0	0		0	52	5.3%
HA	135	120	122	105	105	98	90	64	63	20	5		6	933	94.7%

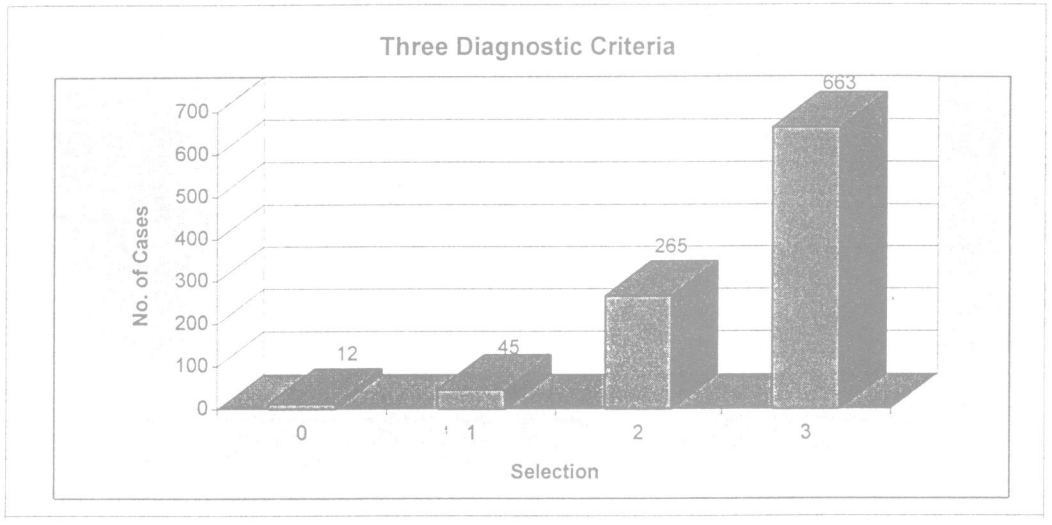


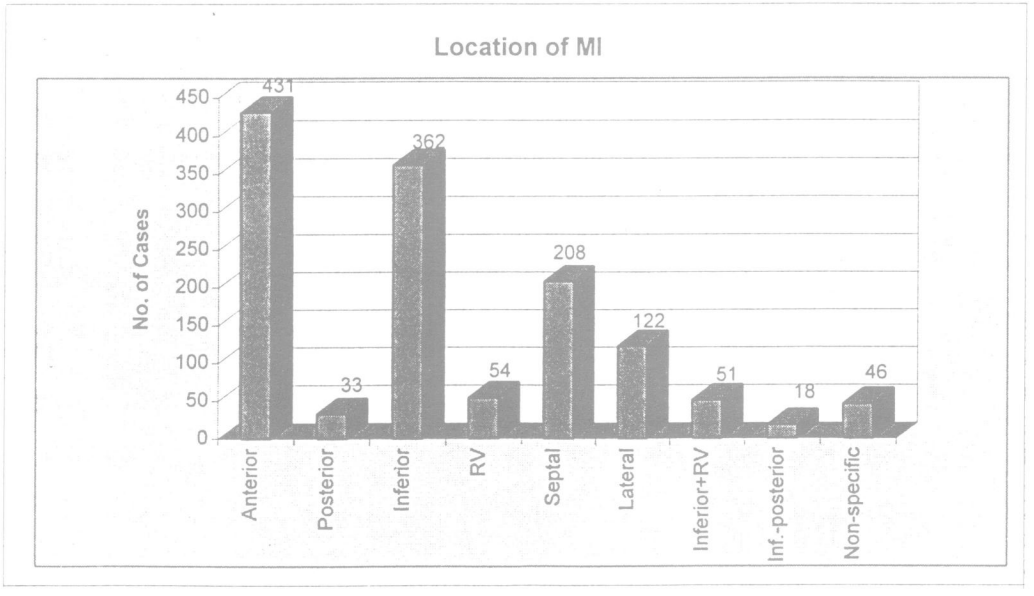
Basic Data on AMI

Diagnostic Criterion

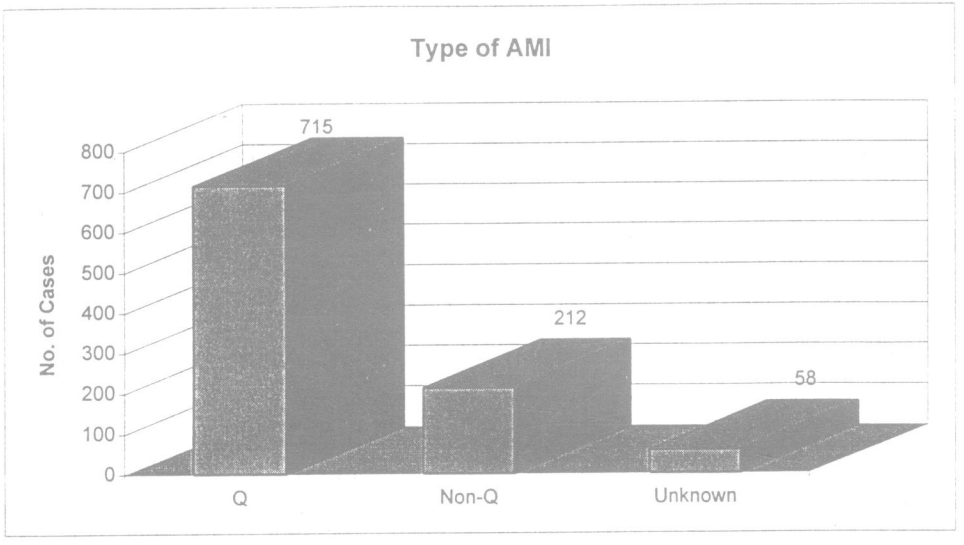
(Pain, + ECG Findings, Enzyme Change)

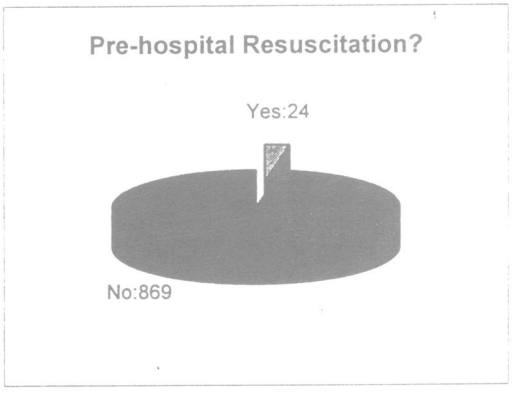
Dx Criteria	Yes	No	Unknown
Chest Pain	849	129	7
+ ECG Findings	896	78	11
Cardiac Enzyme	819	84	82

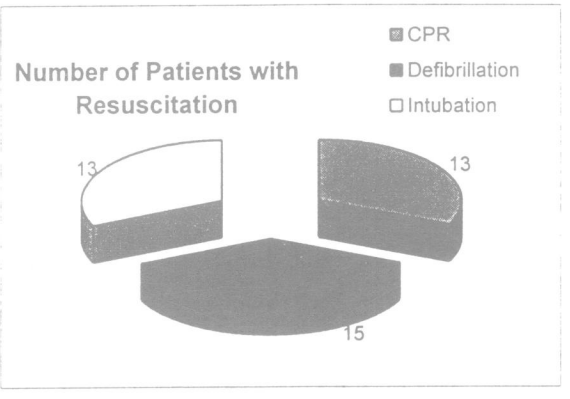


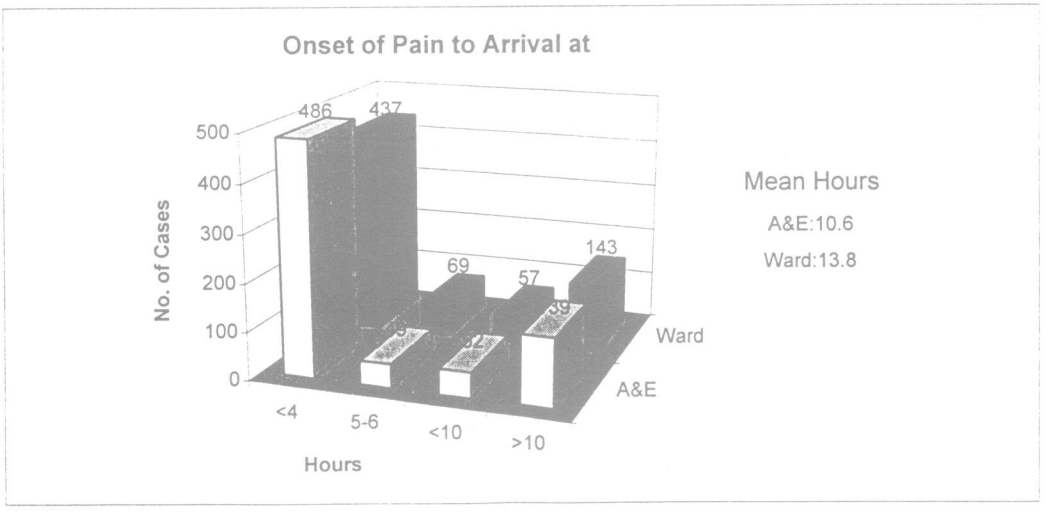


Basic Data on AMI

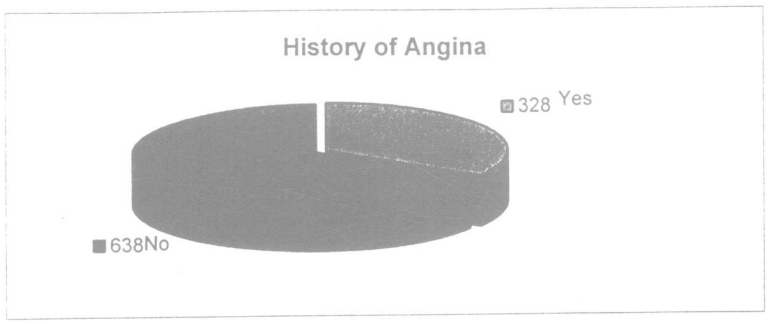


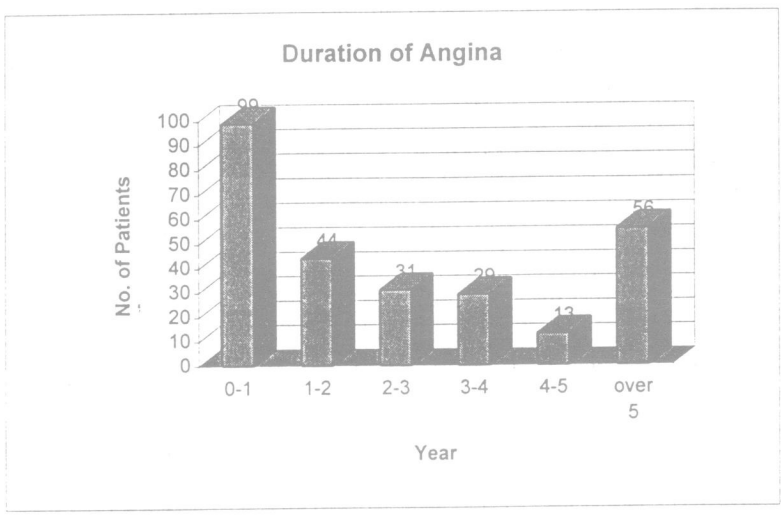


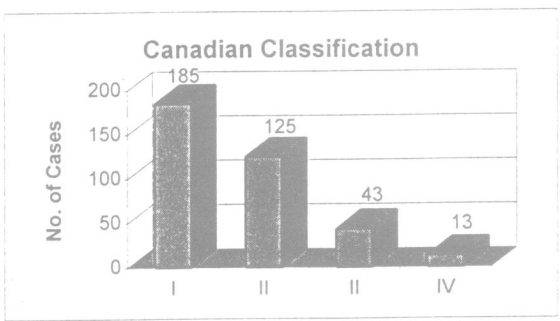


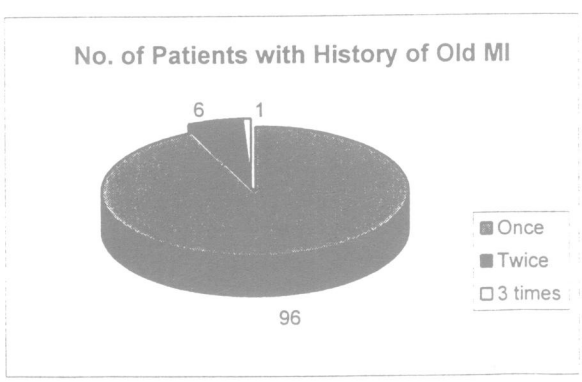


History



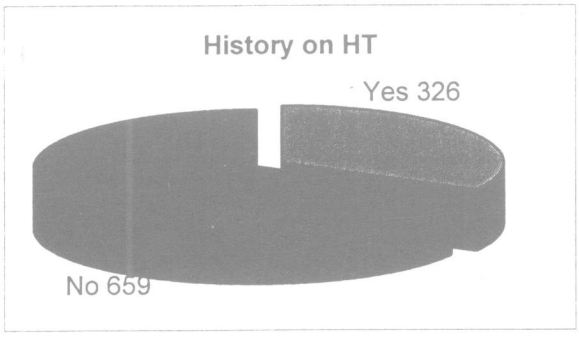


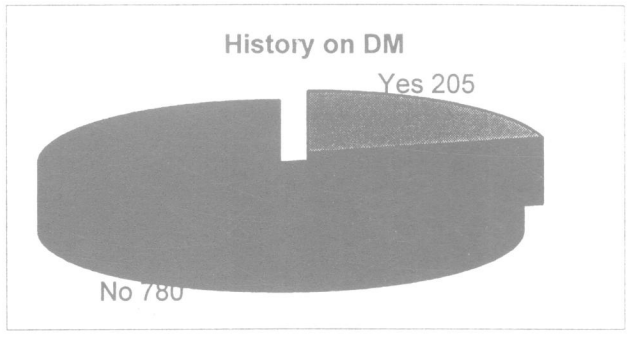


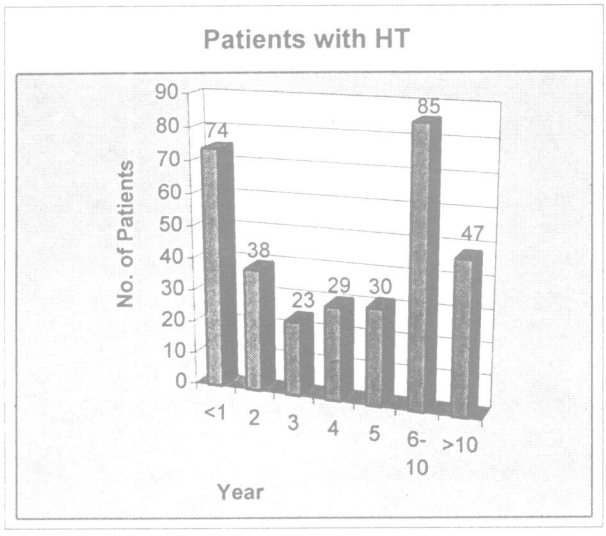


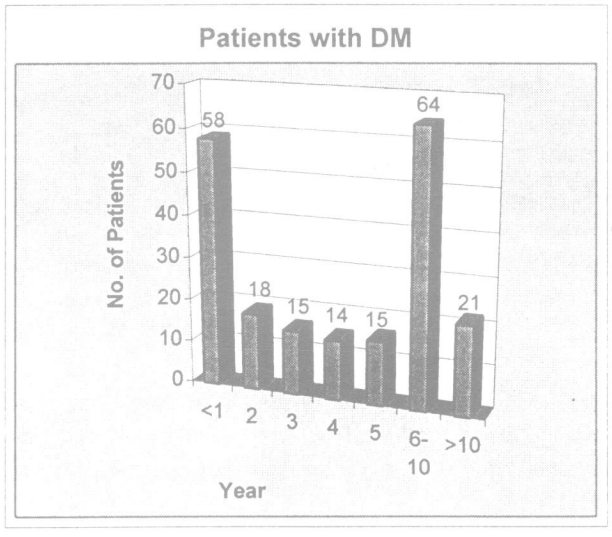
Times of present MI & previous MI	First attack	Last attack
< 3 mths		3
3 - <6 mths	23	1
6 - < 12 mths	36	10
< 2 yrs	27	
< 3 yrs	0	
3 - 10 yrs	0	11
> 10 yrs	0	
No entry	899	960

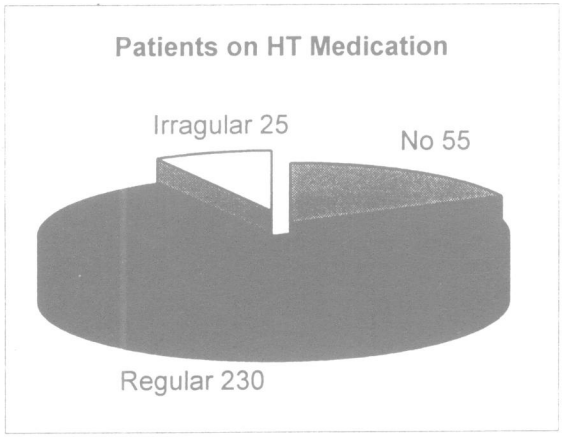
History

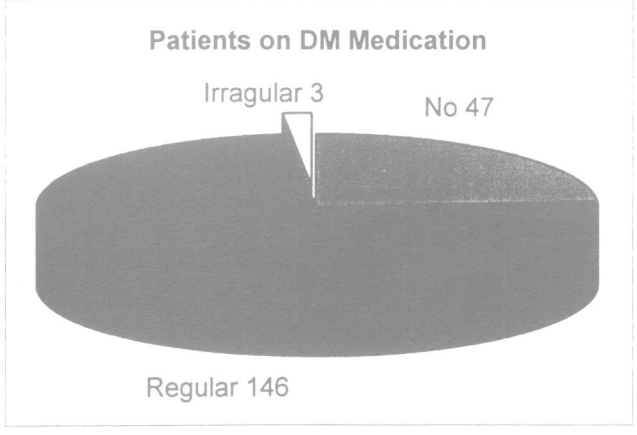

History on HT
Yes 326
No 659


History on DM
Yes 205
No 780


Patients with HT
No. of Patients
90
80
70
60
50
40
30
20
10
0
74
38
23
29
30
85
47
<1
2
3
4
5
6-10
>10
Year


Patients with DM
No. of Patients
70
60
50
40
30
20
10
0
58
18
15
14
15
64
21
<1
2
3
4
5
6-10
>10
Year

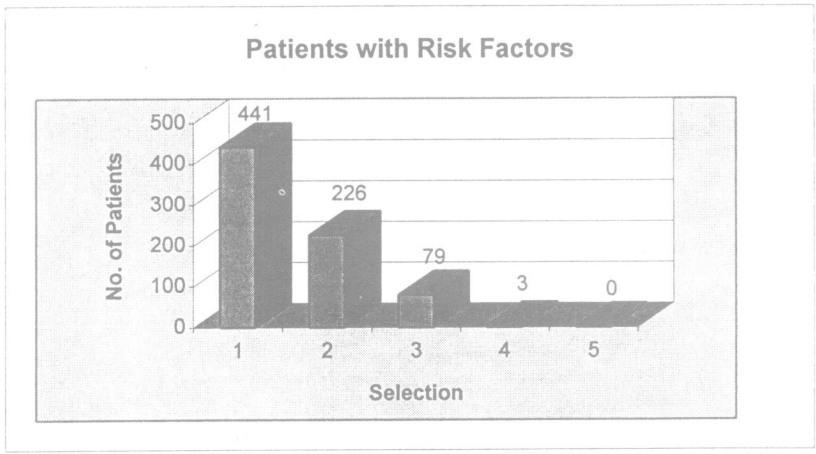

Patients on HT Medication
Irragular 25
No 55
Regular 230

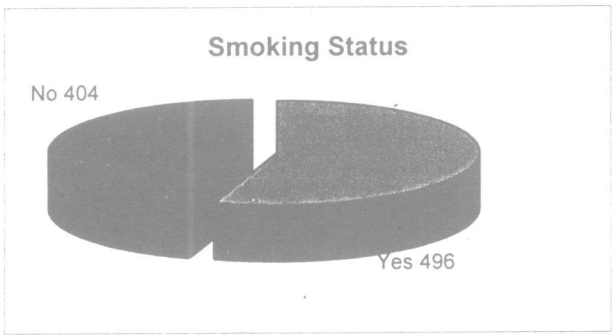

Patients on DM Medication
Irragular 3
No 47
Regular 146

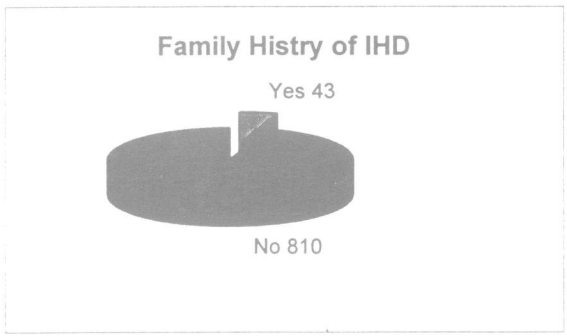
The five risk factors: Familly Histry, smoking, hypercholestolaemia, HT, DM

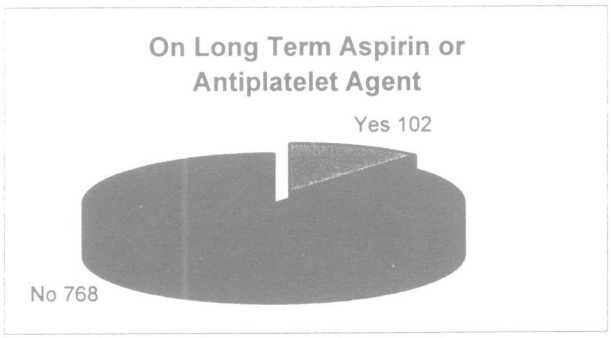
Number of patients with non of the risk factors: 226

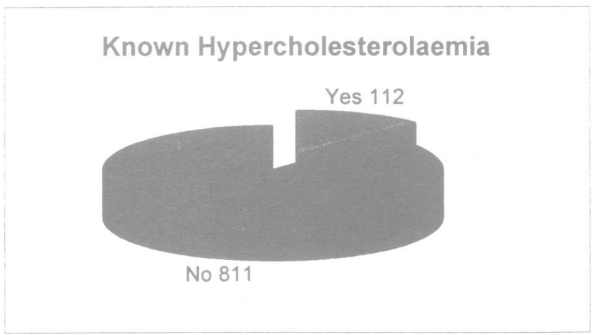
Total number of patients with risk factors: 759



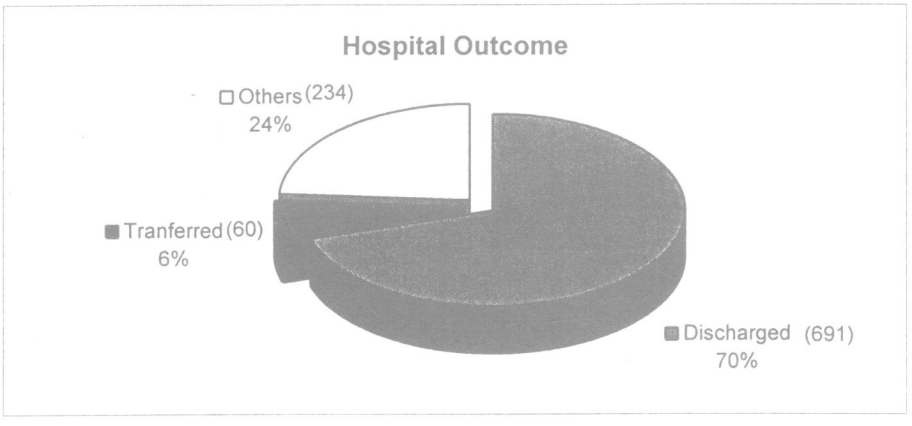


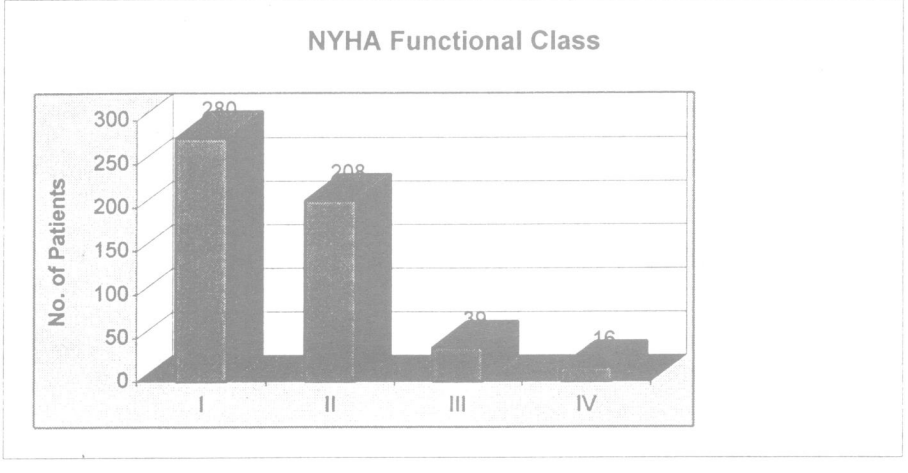


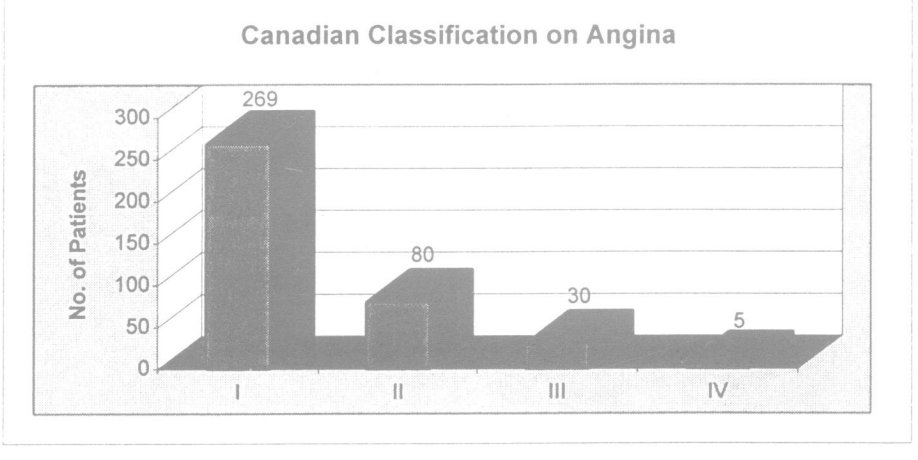




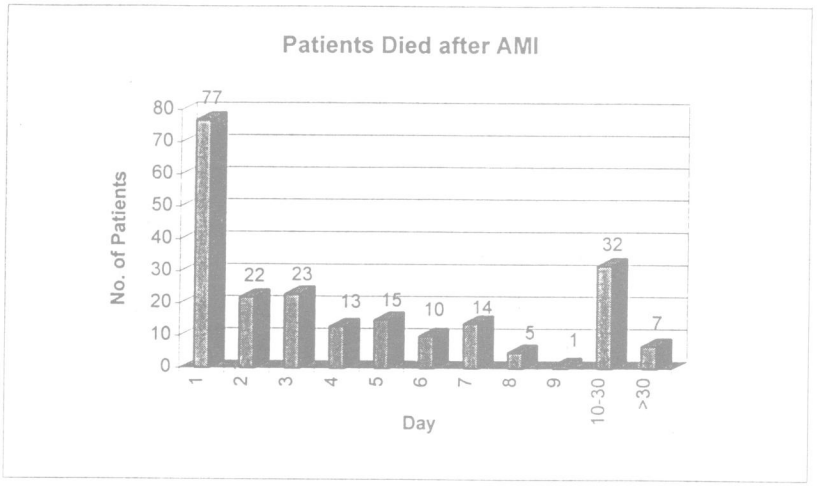
Hospital Outcome

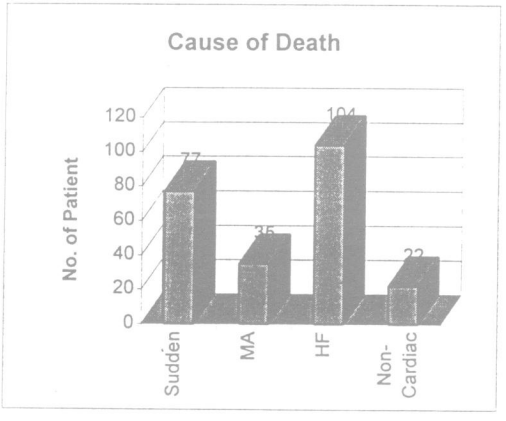


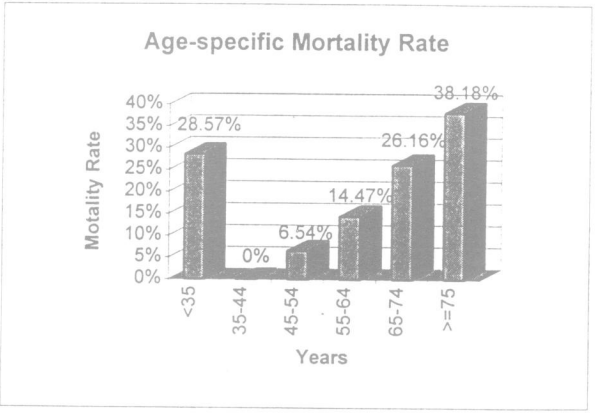


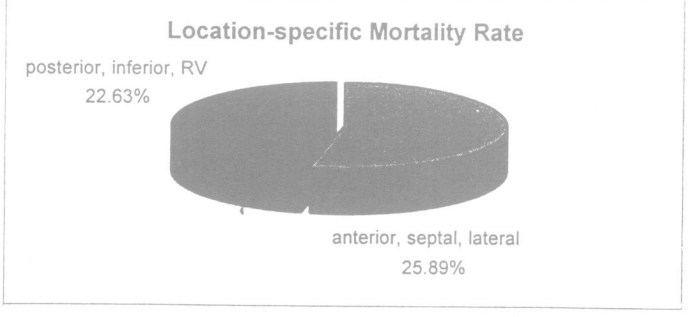


Hospital Outcome









Forum

Cardiac Rehabilitation In Hong Kong

CARDIAC REHABILITATION PROGRAMME IN PRINCESS MARGARET HOSPITAL

Suet-Ting Lau

Aim

Cardiac rehabilitation combines prescriptive exercise training with coronary risk factor modification in patients with established heart disease. The ultimate goal is to restore and maintain an individual's optimal physiological, psychological, social and vocational status. The programmes targeted at exercise, lipid management, hypertension control and smoking cessation can reduce cardiovascular mortality, improve functional capacity, attenuate myocardial ischaemia, retards the progression and foster the reversal of atherosclerosis and reduce the risk of further coronary events.

Development

The cardiac rehabilitation programme in Princess Margaret Hospital began with planning in October 1992. Pilot Phase I program started in January 1993 in the Coronary Care Unit and the overflow male ward. The service extended to all medical wards in January 1994 and Phase II programme commenced in October 1994. In collaboration with the communicty rehabilitation network, Phase III and IV maintainance programme is also made available to the patients. As there is no ideal rehabilitation program that will encompass the needs of every patient, we adjusted and modified our program after evaluation. Through interdisciplinary approach, the programme had evoluted to the present state that we hope will suit the needs of most patients with the resources available.

The Rehabilitation Program

Cardiac Rehabilitation program is traditionally divided into four phases. The Phase I in-patient, Phase II out patient and Phase III and IV maintainance program.

The Phase I inpatient program commence once the patient is stablized after acute myocardial infarction. Early ambulation and physical exercise to minimze the deconditioning due to bed rest together with education on heart disease, management of acute attack, diet, smoking, lifestyle management to enhance early recovery and discharge by our cardiac rehabilitation team consisting of nurses, physiotherapist, occupational therapist, dietietian, medical social worker and doctors. Weekly ward round and case discussion by the team serve to formulate a treatment plan for the patient.

Patients would be recruited into Phase II out patient program if they are

suitable. This consist of five consecutive weekly session of counselling, exercise, relaxation therapy and education program. The topics of education include :

1.Diet

Low fat AHA Step I diet for all patients. Patient requiring diabetic, reduce body weight and Step II diet are interviewed by dietitian ndividually.

2. Exercise

Exercise and physical activity including sexual activity advice given by the physiotherapist with weekly reassessment of the home exercise program.

3. Heart disease and medication

Education on the pathophysiology of heart disease home management of heart attack and medications are given by the cardiac nurse.

4. Lifestyle

- The lifestyle and stress management including smoking effects and its cessation are adviced by the occupational therapist.

5. Psychosocial

- The medical social worker deals with the financial and psychosocial aspects of the disease and its effect on the patient.

On discharge from the Phase II program, patients will be introduced to the maintainance program conducted by the Community Rehabilitation Network.

During the period from January 1994 to August 1995, a total of 148 patients were recruited into the program. There were 105 male and 43 female patients with an average age of 63 (Table I).

Although the average age is 63 and the majority are between 50 to 80 years, more than 10%. (16) are below 50 years of age. The male sex predominates as in other series of patients. The majority 82%(122) are post acute myocardial infarction patients. The proportion of smokers 31% (46) is high and smoking cessation should be specifically the treatment goal for these patients. 45%(67) has primary education while 35%(52) are illiterate. Thus, we had designed educational materials which are simple anad suitable for these patients. To cater for the more educated patients, we had supplemented them with more advanced reading materials.

Future development

In the future, we would like to extend our rehabilitation program to those patients with coronary heart disease e.g. angina, unstable angina for secondary prevention.

A pilot case management programme for a different category of chronic heart failure patient had been implemented by the community nursing service and the cardiac rehabilitaiton team. With better home care, shorter hospital stay and decrease readmission would be expected.

Special smoke cessation programs will be provided for smokers.

The cardiac rehabilitation team is committed to holistic care for our patients and will continue to provide an improving quality service.

Table 1
Cardiac Rehabilitation Program
Patient Demographic Data

Total No		148
Average Age		63
Age	30-40	4
	40-49	12
	50-59	39
	60-69	51
	70-79	40
	>80	2
Sex -	Female	44
	Male	104
Diagnosis -	AMI	122
	Others	26
Smoking -	Nonsmoking	60
	Smoker	46
	Exsmoker	42
Drinking -	Nondrinker	102
	Social drinker	24
	Chronic drinker	12
	Exdrinker	10
Education level -	Primary	67
	Secondary	21
	Tertiary	8
	Illiterate	52

CARDIAC REHABILITATION AND PREVENTION PROGRAMME ~ TUNG WAH HOSPITAL

Chu-Pak Lau

Abstract

The Cardiac Rehabilitation and Prevention Centre of Tung Wah Hospital is the first of its kind in Hong Kong in the management of patients with heart diseases. The cardiac rehabilitation programme implemented is a structured, comprehensive programme with emphasis on graded exercise training with expert inputs from cardiologists, rehabilitation consultant, nurses, physiotherapists, occupational therapists, dietitian and medical social worker. The rehabilitation process is divided into four phases. Phase I is an in-hospital phase aiming at in-patient ambulation training. Phase II is a three-months supervised out-patient programme in which patients come to the centre regularly for exercise, education, dietary advice and counselling. Phase III is a community based programme for six months in which home and community based rehabilitation programmes are conducted with appropriate supervision from the centre. Phase IV is a long term maintenance phase in which participants will continue life long attention to risk factors control and rehabilitation. Apart from risk factor modifications and exercise training, sessions on smoking cessation, weight reduction, lipid control and stress management are conducted.

From its establishment in 1992, a total of 280 patients have been treated by the centre. Patients who were recruited in the programme had significant improvement in HDL-Cholesterol by 13.2% and a decrease in LDL-Cholesterol by 14.9% in 3 months. There was improvement in exercise capacity by 51% recorded, and 81% of patients returned to a gainful employment.

In conclusion, cardiac rehabilitation has a significant contribution in improving the functional status of patients with cardiac diseases, the modification of life threatening risk factors as well as their quality of life.

Introduction

Years ago, people with cardiac diseases were treated as invalids. The hope of returning to full time work was dismal. With the advancement of medical technology and pharmacology, treatments for cardiac patients are radically different now. Both life style modification and medication therapy can reduce the morbidity and mortality of heart diseases. A well structured cardiac rehabilitation programme aiming at optimising cardiac persons' physiological, psychosocial status, modification of risk factors for secondary prevention and the ability of going

back to previous work are now evidenced with the data collected by the Cardiac Rehabilitation and Prevention Centre of Tung Wah Hospital. An active role of primary preventive care has also been shouldered by the team.

Cardiac Rehabilitation and Prevention Programme of Tung Wah Hospital

Objectives

1. to restore a person with heart disease to, and maintain that person at his or her optimal physiological, psychosocial, vocational and avocational status.
2 to deal with the identification and modification of unhealthy lifestyle which are recognised risk factors for ischaemic heart disease.
3. to reduce morbidity and mortality related to ischaemic heart disease by means of both primary and secondary prevention
4 to provide a seamless health care programme to cardiac patients by liasing with acute medical and community teams.

The Cardiac Rehabilitation Team

The team consists of cardiologists, a rehabilitation consultant, nurses, physiotherapists, occupational therapists. Support and advice are also provided by a dietitian and a medical social worker.

Category of Patients Recruited for Rehabilitation Programme

1. Post myocardial infarction
2. Controlled heart failure
3. Post angioplasty
4. Stable angina pectoris
5. Post permanent pacing
6. Significant risk factors for ischaemic heart disease
7. Post by-pass graft surgery
8. Post cardiac surgery for valuvlar and
9 congenital heart disease

Phases of Cardiac Rehabilitation and Prevention Programme

The Cardiac Rehabilitaton and Prevention Programme consists of 4 phases (Figure 1). In the year of 1994 / 95, 261 patients have been recruited for the programme while 163 (113 male, 50 female) participated in full programme (Figure 2). 98 have attended the educational programme. 93 (57%) had acute myocardial infarction. 50 (36.8%) had ischaemic heart disease. 8 (4.9%) suffered from cardiomyopathies and 2 (1.3%) had valvular heart disease. 20.3% were aged between 51-60, 42.3% were between 61-70. 22% were between 71-80.

Phase I
(In-patient ambulation programme)

Objectives

1. to assess and evaluate patient's condition for entry into phase II-IV of the programme
2. to minimise problems associated with prolonged bedrest, e.g. muscle atrophy, deep vein thrombosis, pulmonary embolism, infection etc.
3. to reassure patients that they are not permanently incapacitated

Patient Entry

Patients with uncomplicated MI will be recruited.

Assessments

1. Medical
   Information in relation to the diagnosis,

relevant past medical history, investigation results, treatment and presenting clinical status are collected.

2. Nursing
   Vocational and psychosocial evaluation of patient and the family and to enlist the help of occupational therapists, medical social worker, psychologist and the voluntary helpers where appropriate.
3. Physiotherapy
   Physical status including range of movement, power, ambulation, balance and gait are assessed.
4. Occupational therapy
   Living environment, activities of daily living, household tasks, daily physical demand and posture are evaluated.
5. Dietary
   Dietary history is assessed.

Exercise programme

Activities begin when the patient is clinically and haemodynamically stable. A 7-step exercise training is conducted. Exercise level is progressly increased according to the patient's tolerance.

Educational programme

Education sessions are conducted when the patient is ready to learn. Advice is given to the patient in identifying their risk factors in relation to the disease. Information for successful self-management is given.

Before hospital discharge

1. A predischarge exercise test is arranged for risk assessment and exercise prescription.
2. Patients' assessment meeting is conducted. Recommendations are drawn from doctors, nurses, physiotherapists, occupational therapists, medical social worker.
3. Review of patient's suitability for entering Phase II-IV with goals set for target body weight, blood lipid control and the functional exercise capacity.

Achievements

Number of patients

100 patients from QMH and PYNEH were recruited.

Phase II
(Supervised out-patient programme)

Objectives

1. to restore functional level appropriate for the physical condition, thus preparing the patient to return to work.
2. to help patient and family members to adjust to an appropriate lifestyle modification.
3. to provide guidelines for long term exercise programme
4. to control risk factors for heart disease.

Exercise programme

The programme includes dynamic, aerobic muscular activities such as treadmill or cyclic ergometry for a minimum of 30 minutes per session, and for 2 sessions per week for 8 weeks.

Educational programme

It is conducted 2 times per week before exercise training. Each session lasts for 45 min.

Secondary prevention

Goals set at entry are assessed and reviewed in the cardiac rehabilitation clinic.

Evaluation

1. repeat medical assessment
2. repeat nursing assessment
3. repeat physiotherapy assessment
4. repeat assessment by other teams (dietitian, occupational, social worker etc.)
5. symptom limited exercise test
6. formulate entry into phase III

Achievement

Number of Patients

A total of 158 (113 male and 45 female) patients entered this phase, in which 63 were referred from other institutions, QMH (47), Ruttonjee (7), PYNEH (5), QEH (1), TGH (1) and the private sector (2). 100 of them were able to complete phase II (69 male, 31 female). Among the 15 people who have not completed the phase, 11 did not have time for the programme, 2 could not attend regular sessions because of stroke, 1 had progressive heart failure and the remaining patient had lung cancer.

Early Intervention

During the progress of the programme, 9 patients were identified to have ischaemic symptoms and 8/9 had successful angioplasty and 1 had coronary artery bypass surgery.

Weight Reduction

17 patients in the programme were overweight. Within 2 months, 13 of these 17 were able to reduce their weight by 2.3%.

Smoking Cessation

50 of the 64 chronic smokers ceased smoking while 14 have reduced cigarette consumption.

Improvement in Lipid Profile

Favourable reduction of LDL-Cholesterol and increase in cardio-protective HDL-Cholesterol were noted among the 100 paticipants in phase II. 13.2% of improvement in HDL-Cholesterol and a decrease in LDL-Cholesterol by 14.9% (Figure 3).

Exercise capacity

51% of improvement in exercise capacity between phase I and phase II with a mean of 4.9 METS in phase I and a mean of 7.4 METS on completion of phase II (Figure 4).

ADLs Improvement

39% of patients were ADL dependent on initial assessment and 86% were independent on completion of phase II (Figure 5).

Return to Work

69% of patients who were working before the onset are able to return to their previous job. 13% have to change their job nature, 16% have to retire from work and 2% of other reasons (Figure 6).

Phase III

(Community -based programme)

Exercise Programme

This programme is conducted in a community facility or at home. Each exercise session includes the following:

1. 10-20 min of floor exercise as warm up
2. 30-45 min of continuous endurance

activity e.g. walking, jogging, cycling and swimming

3. 5-10 min of cool down exercise

Patients are recommended to undergo this 3-5 days a week.

Stress Management Programme

This consists of two sessions of 45-60 minutes each and are run by the physiotherapist and occupational therapist. Each patient has to attend a minimum of two sessions.

Group Function

Social recreational functions are organised in conjunction with voluntary bodies to reinforce rehabilitation and risk factor control.

Achievements

Number of patients

100 patients entered phase III (69 male, 31 female) with 37 completed the phase. 2 patients were not able to continue as a result of progressive heart failure and lung cancer.

Early Intervention

In the progress of the programme, 2 patients were noted to have ischaemic symptoms. One subsequently had successful angioplasty and one had coronary artery bypass grafting.

Improvement in lipid profile

On completion of this phase, 37 patients have remarkable reduction of LDL-Cholesterol by 30.4%, a decrease of triglyceride by 41.5% with a further improvement in an increase of HDL-Cholesterol by 16.0% (Figure 7)

Exercise Capacity

87% of patients were able to maintain and improve their exercise capacity (Figure 8).

Stress Management

25 patients and 5 family members participated in the 8 relaxation classes held. The mean score of stress level has reduced from 5.9 to 4.5 with the 10 point self-evaluated scale (Figure 9).

Phase IV
(Long term maintenance phase)

This phase is a continuation of rehabilitation conducted at home. A lifelong commitment to regular physical activity and lifestyle adjustment are needed. Realistic training objectives are formulated for each patient.

Aims of Long-Term Exercise Include:

1. to maintain the improved physical condition
2. to reduce coronary disease risk factors
3. to promote the patient's self esteem and confidence

Patient Exit

All patients will exit the cardiac rehabilitation service at the end of phase III. Phase IV involves mainly telephone review, monitoring of the progress of set goals.

Achievements

Number of Patients

37 patients (23 male and 14 female) have succeeded to enter phase IV.

Establishment of Self-help Group

34 were referred to Community Rehabilitation Network for a continuous rehabilitation in the community. A self-help group was established.

Preventive Activities

Secondary Prevention

1. Cooking classes (February & September) provided an opportunity for 20 patients to participate in appropriate food selection and cooking method.

2. 120 patients participated in the " Heart Walk " outdoor activity sponsored by the Hong Kong Bank and co-organised by the Central and Western District Board for a feel of exercise outside the protected hospital setting.

Primary Prevention

1 Conduction of monthly talks on cardiac diseases and its management for the public.
2 Participation in two Health festivals aiming to promote the public's awareness of caring for their hearts.
3. Weight reduction, lipid lowering and coronary clinics are under development.

Conclusion

With the change of lifestyle and socio-economic status among Hong Kong Chinese, it can be projected that coronary heart disease will still be a major cause for our mortality and morbidity rate. The Cardiac Rehabilitation and Prevention Programme of Tung Wah Hospital will continue to play a leading role in both primary and secondary prevention of heart diseases in Hong Kong.

Acknowledgement

The skilful preparation of this manuscript by Ms Yee-man Fong, Rehabilitation Nurse Specialist, Tung Wah Hospital is gratefully acknowledged. Without the team work of staff of Cardiac Rehabilitation and Prevention Centre, the results of this report cannot be achieved.

Reference:

Li L.S.W., Lam K.B., Fong Y.M., Lau C.P., Annual Report of Cardiac Rehabilitation and Prevention Centre, Tung Wah Hospital (1994-1995).

Legends to Figures

Figure 1 Four Phases of Cardiac Rehabilitation and Prevention Programme

Figure 2 Numbers of Patients in Each Phase of Rehabilitation Programme between 2/1994-3/1995

Figure 3 Control of Lipid Profile in Phase II

Figure 4 Improvement of Exercise Capacity in Phase II

Figure 5 Improvement of Activities of Daily Living (self care) in Phase II

Figure 6 Number of Patients Able to Return to Work after Phase II

Figure 7 Control of Lipid Profile in Phase III

Figure 8 Maintenance of Exercise Capacity in Phase III

Figure 9 Stress Management

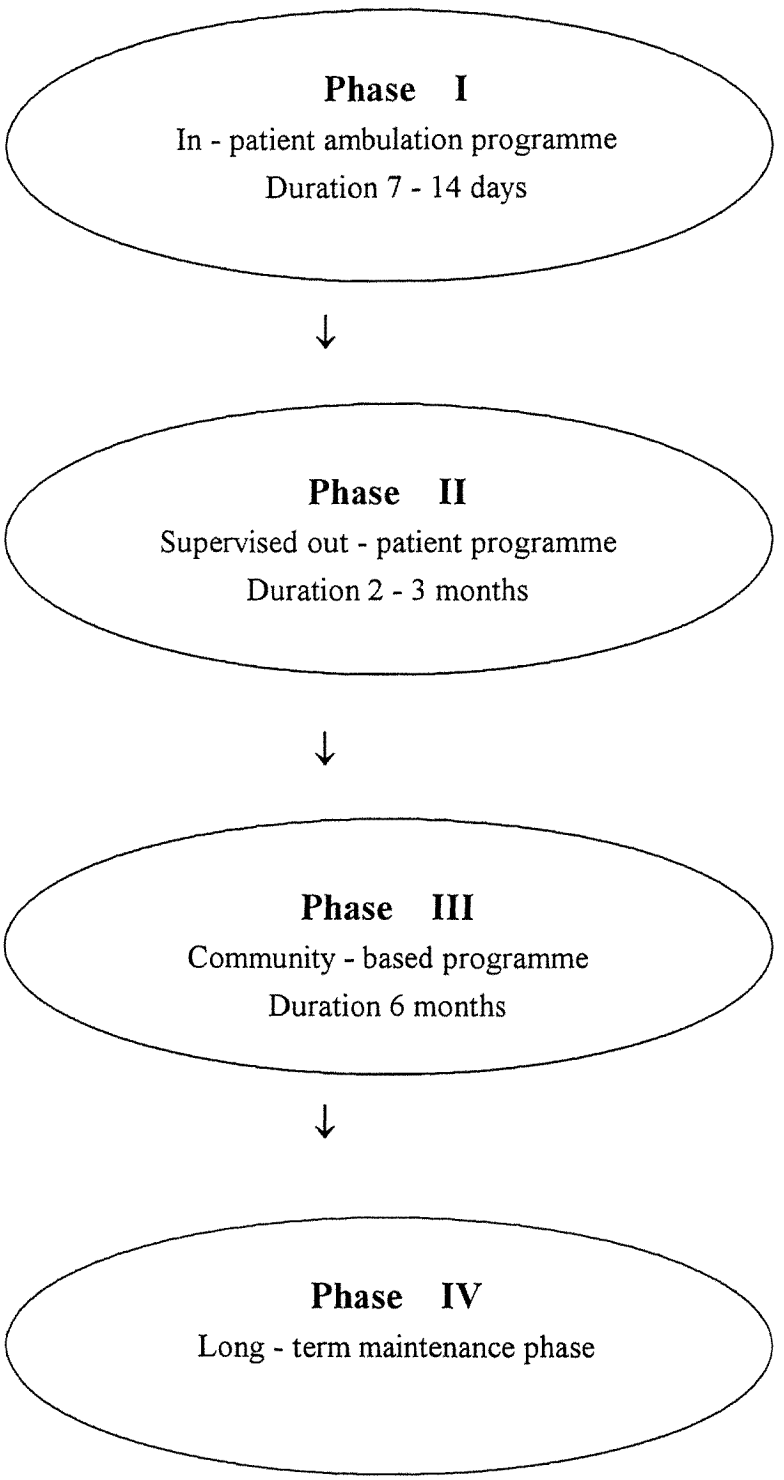

Phase I
In - patient ambulation programme
Duration 7 - 14 days
Phase II
Supervised out - patient programme
Duration 2 - 3 months
Phase III
Community - based programme
Duration 6 months
Phase IV
Long - term maintenance phase

Figure 1

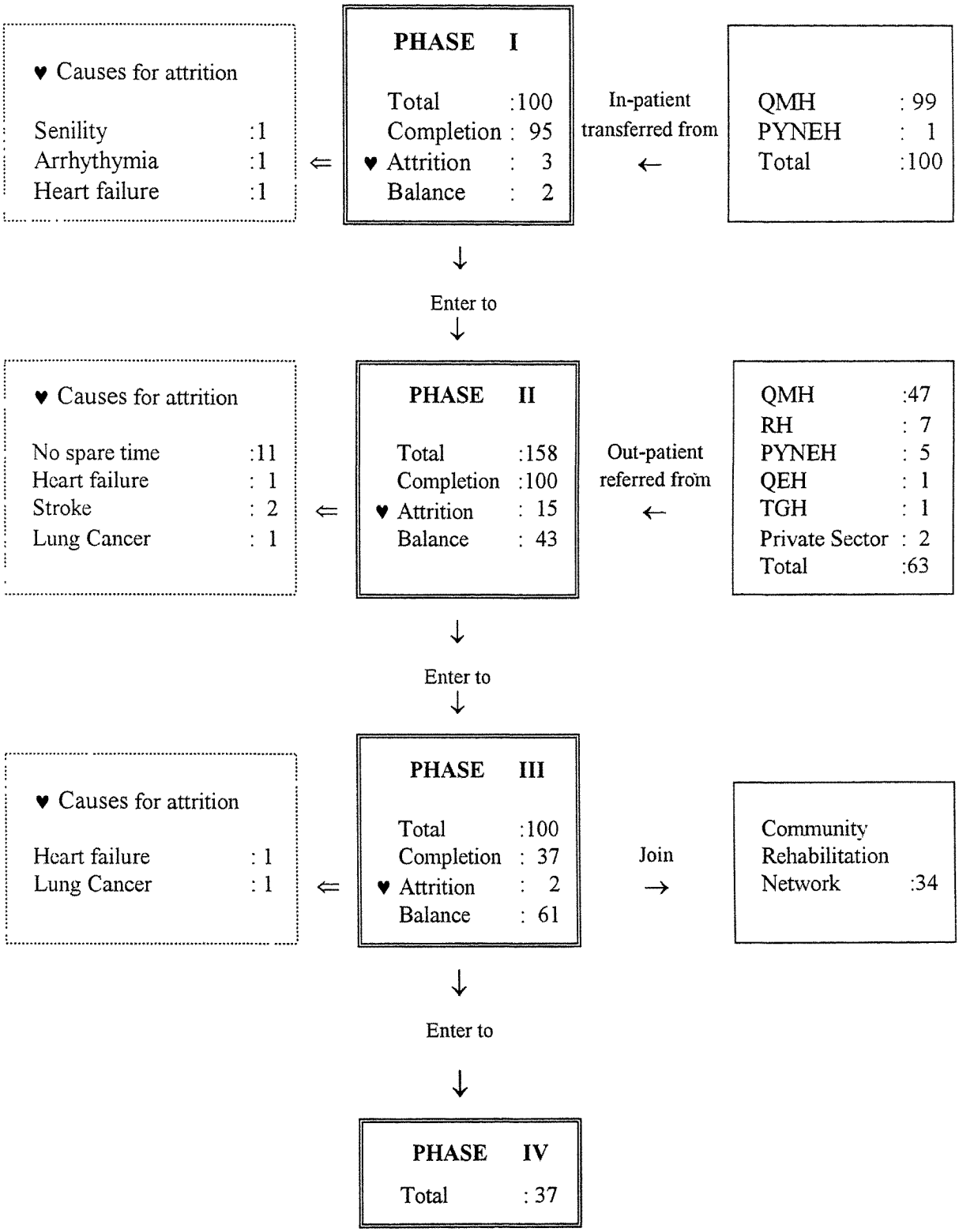

♥ Causes for attrition
Senility :1
Arrhythymia :1
Heart failure :1
PHASE I
Total :100
Completion : 95
♥ Attrition : 3
Balance : 2
In-patient transferred from
QMH : 99
PYNEH : 1
Total :100
Enter to
♥ Causes for attrition
No spare time :11
Heart failure : 1
Stroke : 2
Lung Cancer : 1
PHASE II
Total :158
Completion :100
♥ Attrition : 15
Balance : 43
Out-patient referred from
QMH :47
RH : 7
PYNEH : 5
QEH : 1
TGH : 1
Private Sector : 2
Total :63
Enter to
♥ Causes for attrition
Heart failure : 1
Lung Cancer : 1
PHASE III
Total :100
Completion : 37
♥ Attrition : 2
Balance : 61
Join
Community Rehabilitation Network :34
Enter to
PHASE IV
Total : 37

Figure 2

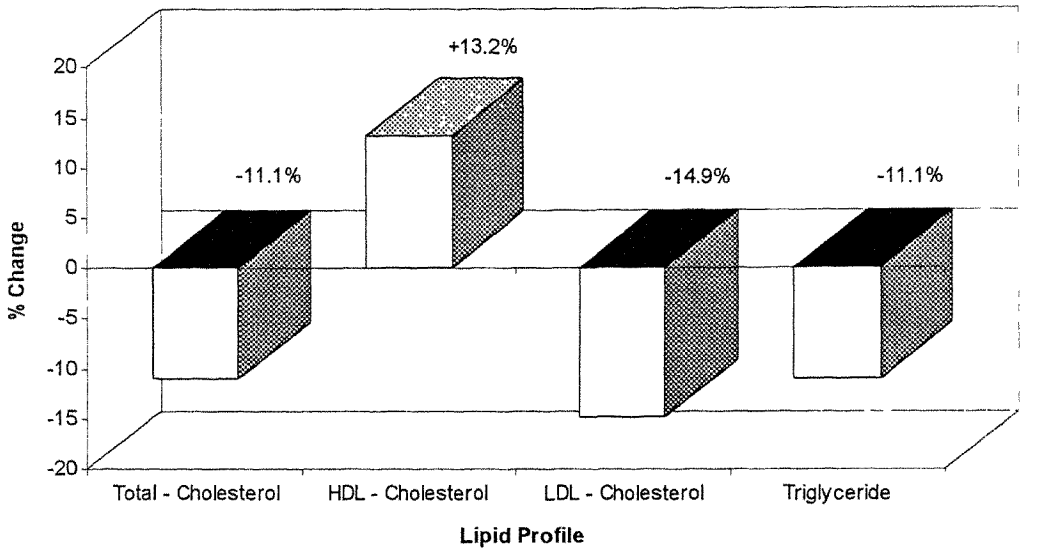


Figure 3

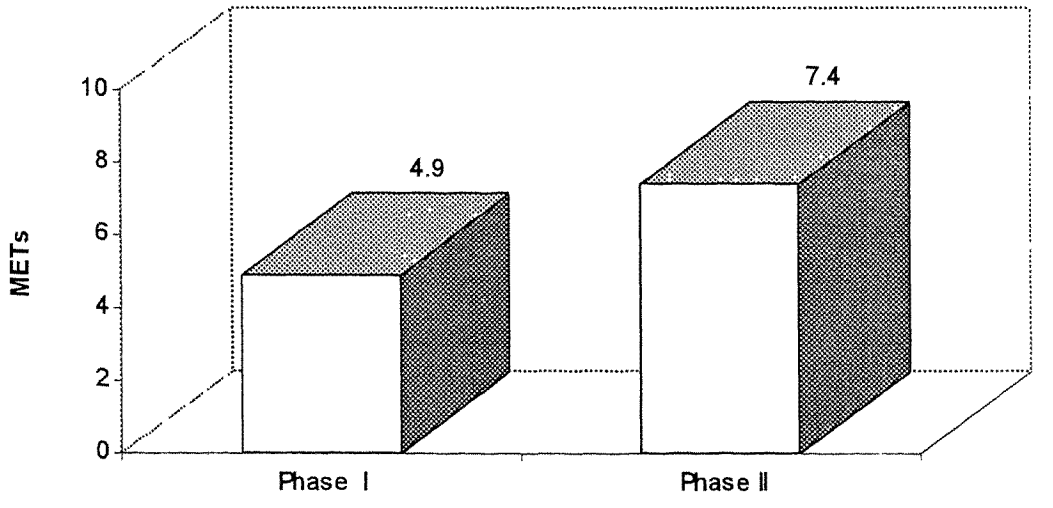


Figure 4

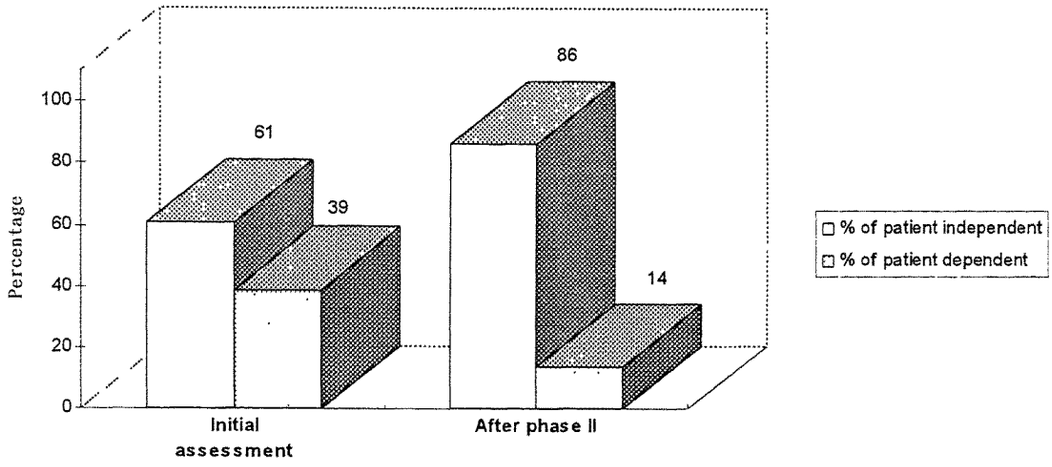


Figure 5

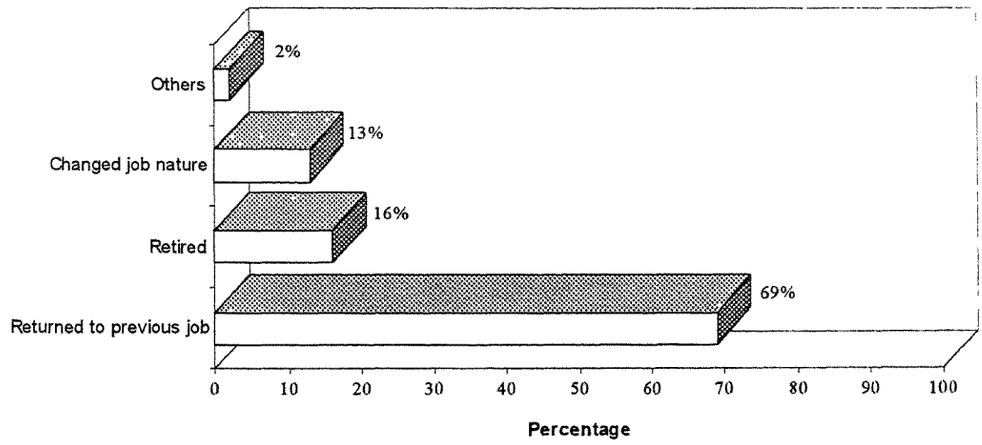


Figure 6

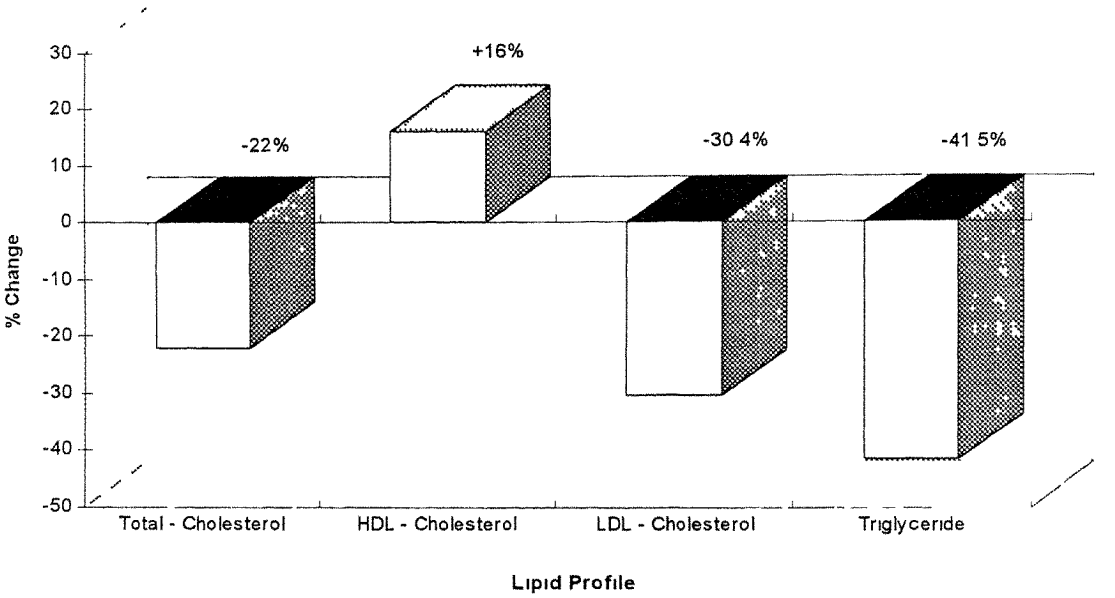


Figure 7

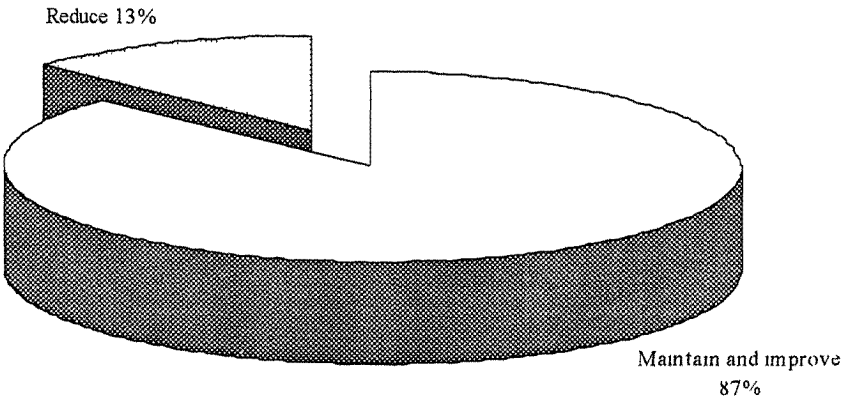


Figure 8

CARDIAC REHABILITATION IN GRANTHAM HOSPITAL

Liang Chow

The last three decades have seen extensive changes in the management of heart diseases. Thirty years ago it was commonplace for patients suffering from myocardial infarction to be hospitalized for a prolonged period up to eight weeks, let alone four weeks of complete bed rest! Return to work and normal daily activities was seldom achieved within six months. The introduction of Coronary Care Unit, Intensive Care Unit, paramedical ambulances, improved pharmaceutical preparation of thrombolytics, new modalities of cardiac intervention and cardiac surgical techniques have revolutionalised the scene and have resulted in a significant reduction in the mortality rate from acute myocardial infarction [1], coronary artery disease and cardiovascular diseases in general

In some countries the incidence of patients being able to return to their previous level of functioning has increased, however in less privileged areas, this has been most disappointing. The failure to return to work after myocardial infarct or bypass surgery can in part be due to depression after the event [2] and some workers hare reported an incidence of as high as 80% [3]. Despite this evidence, cardiac rehabilitation programmes tend to concentrate on the physical aspects of the patient rather than addressing their needs as a whole. This is further influenced by the results of many studies which have suggested that exercise training alone does not significantly improve myocardial blood supply or left ventricular function. Two reasons for this may be poor compliance with the programme and insufficient stimulus or family support.

In a study compliance with exercise training in the general population is known to be poor yet Eshani(1986) has shown that prolonged and intensive exercise training significantly improved left ventricular function in patients with coronary artery disease. The programme involved gradually increasing physical activity both in frequency and duration. At the end of the programme 50% of their patients became asymptomatic, 30% experienced less angina with only 20% feeling no change. It is clear that in order to optimize the physical and mental recovery in cardiac patients, a rehabilitation programme should provide an adequate and appropriate exercise protocol to improve myocardial performance. Compliance rate has to be enforced and lifestyle modifications are mandatory as part of the secondary prevention programme for ischaemic heart disease.

The Cardiac Rehabilitation Programme Committee in Grantham Hospital was originally set up in February

1993. The aim is to design and to provide a rehabilitative programme to restore physical, psychological and social functions in patients suffering from myocardial infarcts, chronic angina pectoris and who have undergone coronary artery bypass graft surgery and cardiac interventions, or patients with valvular heart disease that required valvular replacement surgery. The committee responsible for the programme is multidisciplinary and adopts a team work approach and comprises of specialists from medical, nursing and allied health professionals such as physiotherapists and dietitians. The Programme is divided into three phases. Phase 1 programme is for pre-discharge patients during their first to second weeks of hospitalization during which exercise prescription and activity programmes are provided. It also aims at prevention of anxiety, depression and deconditioning and hence should hasten the recovery to normal self care level. Phase 2 programme is designed for post discharge patients aiming at convalescence and maintenance of treatment and supervised cardiac and exercise training required to a return to previous activity level and work. The education subcommittee is also incorporated to implement educational programmes and teaching aids on illnesses, medications, pre and post operative care, and lifestyle or risk factors modifications. The Phase 2 programme was officially inaugurated in September 1994.

About 20 % of all the patients undergoing cardiac surgery entered into the programme and 60% of them have graduated and proceeded to phase 3. It is expected that the enrollment will remain at 20 to 30 % due to regionalisation of patients' post-operative care. Patients living at a distance have encountered difficulty with travelling and lack of relatives' time and escort.

Recruitment to patients after cardiac interventions is small, this is due to the efficient percutaneous technique and shortened hospital stay and as no bypass surgery is involved, patients can return to work almost immediately after the procedure. Risk factors modification and education, however, has become a more important issue for this group of patients.

Following the graduation from phase 2 programme most patients will proceed with the phase 3 programme by engaging in telephone contacts and annual review for progress and assessment will be performed. Up to now there are already 59 patients completed the phase 2 programme and proceeded with phase 3 programme. We anticipate that the recruitment for next year will be 30% more with the expansion of service.

Cardiac rehabillitation in the future rested on better activity classification of patients group according to their exercise capacity and also basing on thier left ventricular function, completeness of revascularisation in CABG group and the presence of potential life-threatening arrhythmias in patients with cardiomyopathy and residual myocardial ischaemia [4]. The establishment of a combined extended phase 1 and geriatric cardiology unit is being vigorously considered as more than 40% of the our patients are over the age of 65 and some of the patients with advanced valvular heart disease and cardiac cachexia and systems failure and probably diabetic patients would need a modified low exercise intensity programme.

The instalment of a metabolic testing machine for VO2 max is earnestly needed for risk stratification and better assessment of patients with valvular heart

diseases, combined cardiac and pulmonary pathologies, heart transplant recipients and patients recruited for TMR(transmyocardial laser revascularisation), better presurgical and rehabilitation assessment and the monitor to response to the programme. Networking with the Hong Kong Society for Rehabilitation and other community rehabilitation has been established and hopefully this will promote inter-organisational liaison and exchange of experience for the betterment of the rehabilitation process.

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History of Cardiac Rehabilitation in Grantham Hospital

1960's	Cardiac surgery 'Phase 1' Adult in-patients for cardiac surgery (mainly valvular replacement)
1980's	Number of patients with coronary artery disease started to surge Performance of CABG and PTCA
1993	February 1993 Phase 1 Post cardiac surgery (CABG and valvular replacement) Post PTCA Cardiomyopathy/ Congestive heart failure Post MI or Chronic stable angina pectoris
1994	Phase 2 Programme planning from mid 1993 to 1994 Officiated in September 1994
1995	Phase 2 graduation Phase 3 Heart transplant/ TMR

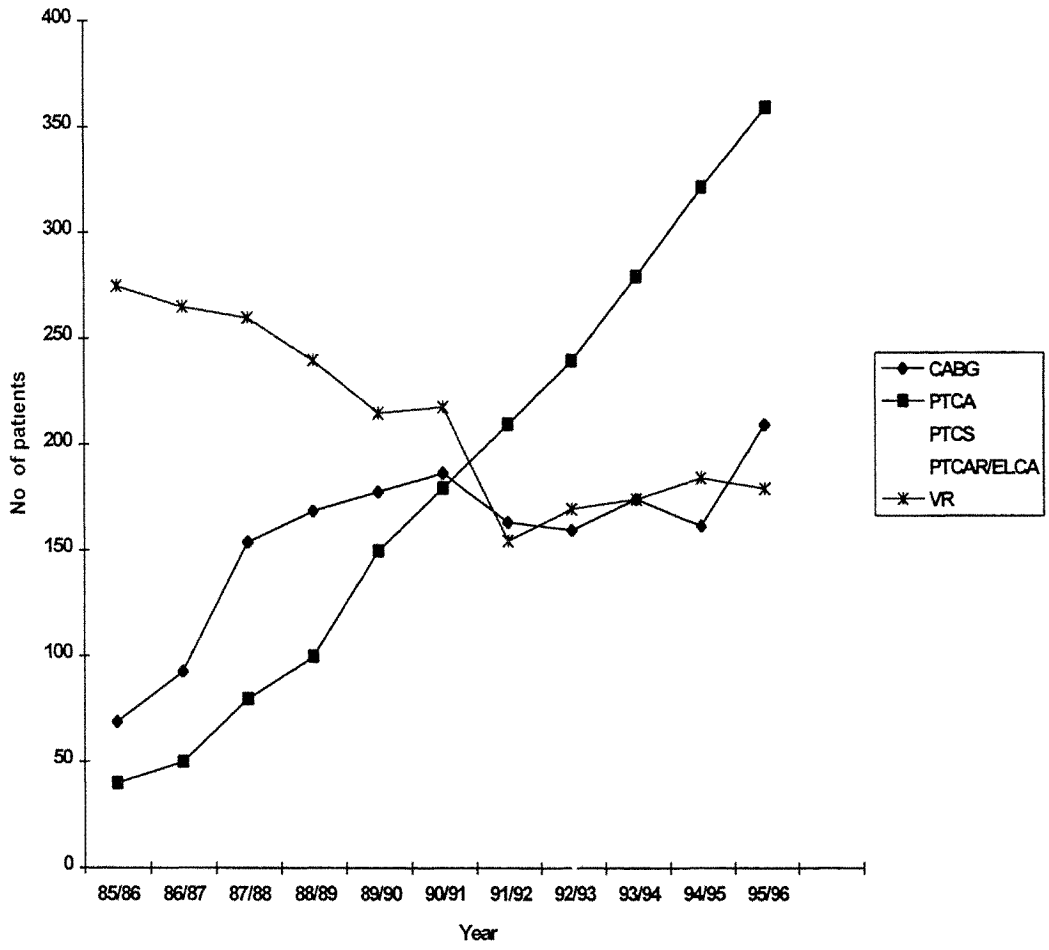
Open Heart Surgery, Grantham Hospital, 1994

CABG	162
CABG + VR	11
VR	175
AORTIC ANEURYSM +/- DISSECTION	20
CONGENITAL	205
OTHERS	23
TOTAL	596

Interventional Cardiology 1994/95

PTCA	192
PTCS	93
OTHERS	36
PBMV	31
TOTAL	352

TREND TABLES FOR CABG, VALVULAR REPLACEMENT, CORONARY INTERVENTION 1985-1995



Cardiac Rehabilitation in the Future

Risk stratification for phase II - programme modification, risk identification basing on METS, LV function, completeness of revascularisation, arrhythmias

Geriatric cardiology service and extended phase I programme for patients with advanced LV dysfunction, cardiac cachexia and multiple systems failure

CABG, VALVULAR SURGERY, PTCA
- > 65 years old , approx 40 %

Metabolic testing
- diagnostic purposes differentiating unexplained dyspnoea (cardiac versus pulmonary)
- better presurgical and rehabilitation workups and monitor response to therapy, determine the optimal time for valve replacement or heart transplantation (survival reduced for patients wit aerobic capacities less than 4 Mets)
- ascertain the target HR for safe rehabilitation, measure degree of impairment, fitness screening and industrial and sports evaluations
- ongoing pulmonary rehabilitation programme

Formation of peer group
- heart walk

COMMUNITY BASED CARDIAC REHABILITATION - COMMUNITY REHABILITATION NETWORK

Jonathan Sham

The Green Paper on Rehabilitation published in 1992 first recognized the psycho-social needs of persons with chronic illness in the community and call for promotion of self-help movements in Hong Kong of persons with disabilities, including those with visceral disabilities. The establishment of the Community Rehabilitation Network (CRN) and its operation in the past 2 years was appropriate and timely in that :

1. it operationalized the policy of the Government to provide psycho-social support services to persons with chronic illness and their families;
2. it helped to realize the concept of seamless health care as advocated by the Hospital Authority;
3. it fostered and enhanced the self-help movement of persons with chronic illness in Hong Kong
4. it provided the basis to test out community based rehabilitation as a means of rehabilitation complimentary to traditional institutional based rehabilitation; and
5. it generated interests in research on Quality of Life (QoL) of persons with chronic illness and their families and effectiveness of CRN's service provisions.

Cardiovascular disease, the second killer disease in Hong Kong for many years, is one of the major target disease groups that CRN has served intensively in the past 2 years.

The goals of our cardiac rehabilitation services are to provide the patients and families with educational programs, so that they are able to take care of themselves in the community, and to make positive decisions about their health, especially on their lifestyles. This is not only necessary in the short period of rehabilitation process, but a long term, perhaps even life-long maintenence.

Knowing that cardiovascular disease is a multifactorial problem which affects the total person, cardiac rehabilitation must include more than treatment of the heart. Along this line, the philosophy of total patient care is widely adopted and being translated into different components of our multi-interventional cardiac rehabilitation services provision model. The components of our services included :

1. Community Based Cardiac Rehabilitation Program

Five classes of cardiac rehabilitation program were conducted, and more than 80 cardiac patients participated. These patients came from different hospitals after they had

completed the acute phases of the rehabilitation program.

This program includes 2 main components, namely the self-management program and the exercise program. The overall aims of this program are to return the patient to an optimum life-style, enhance psycho-social recovery, encourage a wide variety of behavioural and habitual changes, and to maintain optimum level of physical functioning as well as eercise adherence.

2. Care for Your Heart Self-Help Group

The community-based group in Hong Kong for cardiac patients and their families was set up in November 1995 with assistance from our workers. At present, there are more than 300 patient members joining the self-help group. Working closely with CRN, the self-help group organized and provided various types of services and programs, such as educational seminars and exhibitions, supportive groups, newsletter publishing, volunteer visits, and regular health check-ups, etc. In the coming year, the self-help group will continue to offer more comprehensive services for cardiac patients, which aim at promoting mutual support and self-help among cardiac patients in tackling the psycho-social problems related to the illness as well as sensitizing and educating the patients and the public on cardiac diseases and other related issues.

3. Patient and Public Education

It aims at promoting heart health, sensitising the community to heart illness and providing information on the disease process, lifestyle management and risk factors modification.

4. Supportive and Therapeutic Groups

The groups aim at helping patients and thier families to develop better coping skills, in adapting to a chronic health condition, and in dealing with psycho-social issues relating to the illness. The groups include: cooking class, heart walking group, interest groups, relaxation training class, and patient sharing sessions.

Since the inauguration of the Community rehabilitation Network in April 1994, thousands of patients have participated in our activities and services. The results of the 'Quality of Life (QoL)' study that we have conducted among 325 of our service participants, including cardiac patients, revealed that persons with chronic illness who have participated in CRN's programmes showed a better health status and reduction in the number admission days to hospital.

From a qualitative point of view, the study also revealed that these chronically ill respondents experienced an increased sense of power and control through CRN's intervention and process of empowerment. They felt more able to take care of their physical condition and also have an increased sense of control over their mental state. They were more knowledgeable about theil illness, in a better position to decide on treatment modalities, participated more actively in sharing of experiences with others, made better utilization of medical and community resources, built up better network, volunteered their help for other, took more active part in community education and other activities, established more collegial relations with the medical profession, as well as participated collectively to advocate for change of policies for the betterment of the welfare for all.

All in all, cardiac rehabilitation and community based rehabilitation in Hong Kong are still at their infancy and this is just the beginning of collaboration between different medical institutions of the Hospital Authority and the CRN. We look forward to a rapid and strong development in this direction, and fruition soon from this collaboration. Furthermore, we are committed to develop community based rehabilitation as a complimentary approach to institutional based rehabilitation in working with persons with chronic illness and their families, so as to empower them to better cope with their health conditions, and to help themselves and the community at large.

Symposium 2

Treatment of Coronary Artery Disease

ANGINA PECTORIS

Suet-Ting Lau

Definition :

Recurrent symptom complex of discomfort in the chest or related areas associated with myocardial ischaemia.

Etiology :

Coronary atherosclerosis is the commonest cause. Other stenosis conditions associated with angina include congenital coronary artery abnormalities, aortic stenosis, mitral stenosis with severe right ventricular hypertension, hypertrophic cardiomyopathy , systemic hypertension, aortic regurgitation, idiopathic dilated cardiomyopathy, syphilitic heart disease and rarely mitral valve prolapse. Conditions with increase myocardial oxygen requirement such as severe anaemia, tachycardia, fever, hyperthyroidism etc would worsen the angina.

Clinical Features :

History is the most important factor in making the diagnosis.

Angina is usually experienced as a sense of oppression or tightness in the middle of the chest. The discomfort is often not painful and the term the patient use to describe is variable and reflects the patient's cultural background and life experience. The location of pain is ordinarily retrosternal or slightly to the left of the middle and tends to radiate bilaterally across the chest into the ulnar side of the arms, neck and lower jaw, occasionally to the back and occiput.

The duration of pain rarely last less than 1 minute or more than 15 min. Usually is relieved in less than 5 min after rest or using sublingual nitroglycerin.

The angina is usally worsen when walking against a wind, uphill, upstairs, on a cold day and after heavy meals. Intensive emotion, lying flat and violent dreams may also precipitate angina. Patients with angina pectoris usually are classified functionally from Class I to Class VI depending on the amount of activity necessary to induce pain (Table I)

Pathogenesis :

In patients with stable coronary artery disease, angina or silent ischaemia results from increases in myocardial oxygen demand that exceed the ability of stenosed coronary arteries. Unstable angina is usually characterized by an abrupt reduction in coronary flow as a result of fissuring of an atherosclerotic plague and thrombus formation together with vasoactive substance release by platelets endothelial vasodilator dysfunction, and accelerated intimal hyperplasia.

Angina occuring as a result of coronary arterial spasm accompanied by transient ST elevation in the ECG in Prinzmetal's or Variant angina.

Physical Examination is usually negative but evidence of contributory or concomitant disease should be sought. Including the presence of tendon xanthoma, corneal arcus, xanthelasma, hypertension, anaemia, obesity, diabetes mellitus, myxoedema, aortic stenosis and peripheral vascular disease.

Differential Diagnosis

Musculoskeletal pain are provoked by specific movement and tenderness over specific sites.

Pericardial pain may be worsen by a deep breath movement, change of position, exercise or swallowing. Oesophageal pain is burning in quality and relieved by alkalis.

Investigation

Electrocardiography - ECG usually normal in between attacks, occasionally T wave flattening or inversion may be seen in some leads, some may show evidence of previous infarction.

Reversible ST segment depression or elevation with or without T wave inversion at the time the patient is experiencing symptoms or during exercise testing is evidence of ischaemia.

Scanning - Radionuclide Thallium 201 single photon emission computed tomography (SPECT) done with stress showing perfusion defects in ischaemic areas. Echocardiography also provide information about ventricular function and dysfunction.

Position emission tomography (PET) is also sensitive for the detection of coronary heart disease and provide an estimate of coronary, blood flow and coronary reserve as well as myocardial viability.

Coronary Angiography - This provide detailed information about the extent and site of coronary artery stenosis.

Management - The sequence of investigation and management includes three phases (Fig. 2)

1. Assessment of severity of symptoms and the likely extent of disease.
2. Use of measures to control symptoms
3. Treatment which will improve life expectancy including risk reduction measures.

*Patients should be explain of how the symptoms and disease are caused and educated on life style e.g. stop smoking, control diet and exercise.

*Continued cigarette smoking may result in decreased survival, have more angina, more unemployment, a greater limitation of physical activity and more hospital admissions.3

Medical Therapy [5,6,7]

1. Nitrate - Intermittent short-acting nitrate is used for minimal symptoms. Long acting nitrates for moderate symptoms. I.V. for unstable angina.
2. b-blocker - For patients with moderate symptoms not contraindicated for b-blocker
3. Calcium Antagonist - For patients with moderate symptoms not contraindicated.
   Combination of 1, 2 and 3 may be required.
4. Aspirin - 100mg - 325mg daily
5. Heparin - for unstable angina, IV heparin

Low molecular weight, heparin IV and hirudin has been shown to be effective.

Complications such as heart failure, arrhythmia and other concomittent diseases such as hypertension, diabetes mellitus etc has to be treated. Cholesterol lowering is beneficial in preventing coronary heart disease.[8]

Factors that may aggrevate the angina e.g. throtoxicosis, anaemia, fever should be corrected.

Intervention

PTCA (Perantaneous trans/urminal coronary angioplasty) and CABG (coronary artery bypass grafting should be done for suitable lesions.

Prevention

The prevention of heart attack and death should be the aim in treating patients with angina. Comprehensive intensive efforts should be applied in risk factor reduction in all these patients. Team approach with long-term follow up techniques should be used in continuing risk factor intervention over the long term. The risks interventions including smoking cessation, lipid mangement, physical activity, weight management, antiplatelet, ACE inhibitors, beta-blockers and good blood pressure control are recommended. (Table 2)[9]

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Table 1

Canadian Functional Pectoris	*Cardiovascular Classification of Angina*
Class I	Ordinary physical activity, such as walking and climbing stairs does not cause angina. Angina results from strenuous or rapid or prolonged exertion at work or recreation.
Class II	Slight limitation of ordinary activity. Walking or climbing stairs rapidly, walking uphill,walking or stair climbing after meals, in cold, in wind or when under emotional stress or only during the few hours after awakening. Walking more than two blocks on the level and climbing more than one flight of ordinary stairs at a normal pace and under normal conditioins.
Class III	Marked limitations of ordinary physical activity. Walking one to two blocks on the level and climbing more than one flight under normal conditions.
Class IV	Inability to carry on any physical activity without discomfort - anginal syndrome may be present at rest.

Table 2

Guide to Comprehensive Risk Reduction for Patients with Coronary and other vascular disease

Smoking :

Goal - complete cessation

Lipid management :

Primary Goal - LDL <100mg/dl
Secondary Goal - HDL >35mg/dl
TG <200mg/dl

Physical activity :

Minimum Goal - 30 minutes 3 to 4 times per week

Weight management

Antiplatelet agents/Anticoagulants :

Aspirin/Warfarin

ACE inhibitors post-MI

Estrogens

Blood pressure control :

Goal <140/90mm Hg

RISK FACTORS, PATHOPHYSIOLOGY AND MANAGEMENT OF ACUTE MYOCARDIAL INFARCTION

Wai-Hong Chen & Chu-Pak Lau

Risk Factors

A number of conditions and habits present more frequently in individuals who develop ischaemic heart disease than in the general population; these factors have been termed risk factors. They vary in terms of importance in different populations. Risk factors are divided into three groups depending on whether they are reversible or irreversible, and whether they can be avoided. Thus advanced age, male gender and family history of premature ischaemic heart disease (before age 55 years in a parent or sibling) are considered to be irreversible risk factors. On the other hand, reduction of hypercholesterolaemia has been shown to reduce the risk of ischaemic heart disease. Avoidance of cigarette smoking and treatment of hypertension reverse the high risk for atherosclerosis attributable to these factors. Diabetes mellitus, obesity and physical inactivity are potentially remediable.

Among patients presenting with their first episode of acute myocardial infraction (AMI) in a local government hospital, risk factors were present with the following frequencies : smoking (49%), hypertension (26%) and diabetes mellitus (16%). An elevated cholesterol level was detected in 36% of patients at 6 months after AMI and abnormal HDL level in 74% (Figure 1).

Pathophysiology Of AMI

Transmural AMI is usually secondary to thrombotic occlusion of an epicardial coronary artery. The pathophysiology of AMI is divided into 2 phases:

A. Evolving phase

This is the first 6 hours from the time of pain. Myocardial injury has occurred although myocardial cells are still viable. Myocardial salvage can be achieved if blood supply is restored by pharmacological or mechanical revascularisation. Heart rate and blood pressure control can also help to prolong this phase by decreasing oxygen demand.

B. Convalescence phase

If blood supply is not resumed after the evolving period, infarcted muscles will not recover and changes in left ventricular size, shape and thickness involving both the infarcted

and non-infarcted segments of the ventricle often occur, a process referred to as "ventricular remodeling". Acute reperfusion, an open infarct artery per se, intravenous nitroglycerin and angiotensin-converting enzyme inhibitor can attenuate infarct expansion and ventricular dilatation.

Clinical Features

AMI can be either transmural (Q wave AMI) or subendocardial (non-Q wave AMI). Depending on the site of involvement, it can be further classified as anterior, inferior and posterior (Figure 2). The major presenting symptom is chest pain. This is predominantly in the sternal region, but may radiate to both sides of the chest, to the jaw, to the shoulders and to one or both arms. It is usually described as constriction. Sometimes the patient may deny " pain " and described a discomfort in the centre of the chest. Although it can be brief, the pain usually lasts for more than half an hour. Unlike the pain of angina, it is seldom associated with exertion and it is not relieved by rest or glyceryl trinitrate. In some patients, pain is overshadowed by other symptoms, such as breathlessness or syncope. Occasionally, the pain is obscured because the infarction develops during anaesthesia or at the time of a cerebrovascular accident. Rarely, infarction may be truly pain-free. The presentation of AMI in Hong Kong Chinese is summarised in Figure 3. During the earliest stages of the attack, the patient is distressed, and may be sweaty and cold. The general appearance improves when the pain is controlled and often, within a few hours, the patient looks well. The signs are dependent on the associated cardiac complications (Figure 4).

According to a local study, in-hospital mortality for AMI in 1988 was 21% before thrombolysis. 30% died within 24 hours and most occurred in the elderly (72% of these who died were > 65 years). Pump failure was the cause of death in 91% and associated with ventricular arrhythmias in 20%.

Management Of AMI

The principal objectives of management of the patient with AMI are to prevent death from arrhythmia and to minimise the mass of infarcted tissue. Most deaths from AMI occur within the first few hours after its onset and is usually due to ventricular fibrillation . The biggest delay of patients coming under medical observation is between the symptom onset and the patient's decision to call for help. This can be best reduced by public education concerning the significance of chest pain and the importance of seeking early medical attention. Arrhythmias can usually be managed successfully when trained personnel and appropriate equipment are available. Coronary care units have resulted in improved patient care in AMI, reduction in mortality rates, and major increases in knowledge about myocardial infarction.

General measures should include a liquid diet for 24 hours followed by soft diet. Then a regular diet low in cholesterol and saturated fats is appropriate. Stool softener should be used to prevent constipation and straining. Patients need not be confined to bed for more than 24 to 36 hours in the absence of complications. Hypoxaemia is common in patients with AMI and the delivery of 2 to 4 litres/min of 100% oxygen is satisfactory for most patients. Control of cardiac pain can be achieved by narcotic analgesics, nitrates and beta-adrenoceptor blockers.

Evolving phase (Table 1)

Thrombolysis has been clearly shown to reduce mortality and improve myocardial function. In the absence of contraindications, either one of the thrombolytic agents (streptokinase, anisoylated plasminogen streptokinase activator complex, tissue plasminogen activator) should be administered preferably within 6 hours of pain onset to AMI patients. Possible benefits of thrombolysis may extend to 12 hours. A recent trial demonstrated a small benefit with 'front-loaded' tPA and adjunctive intravenous heparin over conventional streptokinase.

Primary percutaneous transluminal coronary angioplasty (PTCA) , i.e., without preceding thrombolysis, has also been reported to be effective in restoring reperfusion in AMI. Morbidity and mortality reduction is even greater than thrombolytic agents, especially in patients with cardiogenic shock. However, this technique is very expensive in terms of personnel and facilities and generalized application of primary PTCA as the reperfusion strategy for AMI will be restricted.

Aspirin also reduces mortality especially in conjunction with thrombolysis. The rate of reinfarction is reduced on long term follow up.

In addition to thrombolytic agents and aspirin, intravenous beta-blocker and nitroglycerin are recommended within the first 6 hours for their effect on limiting infarct size.

Convalescence phase

Oral beta-blocker and angiotensin converting enzyme (ACE) inhibitor should be commenced after the evolving phase and both improve survival. Recent evidence suggests that aggressive reduction of cholesterol level with statins reduce the incidence of future cardiac events and overall mortality (Table 2). ACE inhibitors should be given at a small starting dose and forced titration to the maximum tolerated dose should be carried out before hospital discharge (Table 3).

Non-Q myocardial infarction

Diltiazem may reduce reinfarction in non-Q wave myocardial infarction in those patients without heart failure.

Cardiac Rehabilitation

Although many patients make an initially satisfactory recovery following AMI, the longer term outcome in terms of return to normal activities and freedom from recurrences is often disappointing. Inadequate instruction and rehabilitation may be the reasons behind. A comprehensive and individualised cardiac rehabilitation programme could potentially reduce the morbidity and mortality of AMI patients. Such a programme has short- and long-term goals. The short term goals include physical reconditioning sufficient for resumption of daily activities, education of patients and the family about the disease process, and psychological support during the early recovery phase of the illness. For example, after a rehabilitation programme, 69% of patients were capable of returning to previous joy, and exercise capacity increased for 4.9 to 7.4 Mets. (see chapter). The long term goals include identifying and treating risk factors that influence the progression of disease, teaching and reinforcing the health behaviours that improve prognosis, optimizing physical

conditioning, and facilitating a return to occupational and vocational activities.

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Figure 1. Prevalence of risk factors in patients presenting with acute myocardial infarction in Hong Kong. IHD = Ischaemic Heart Disease.

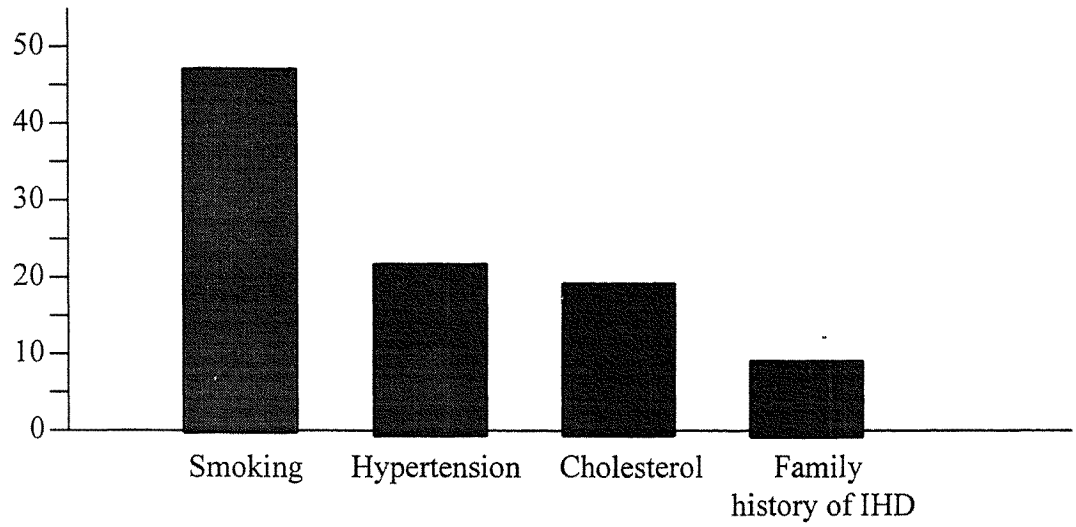

Figure 2. Location of acute myocardial infarction in Hong Kong Chinese.

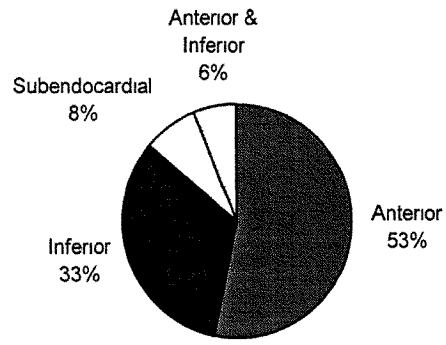

Figure 3. Presentation of acute myocardial infarction in Hong Kong.

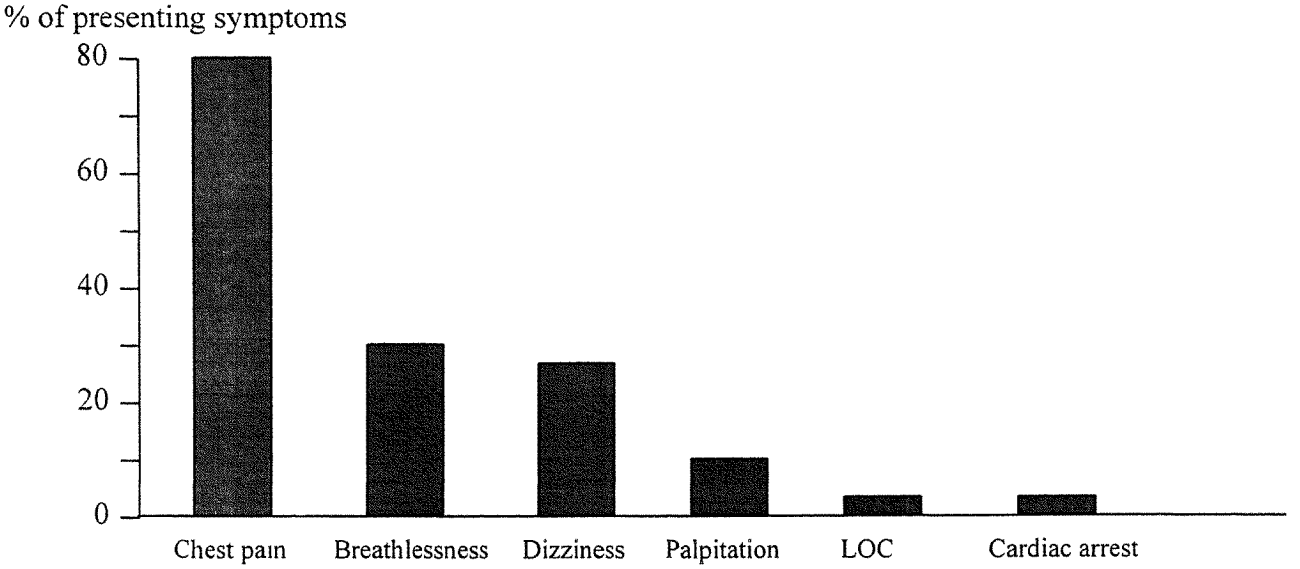

Figure 4. In - hospital complications of acute myocardial infarction in Hong Kong.

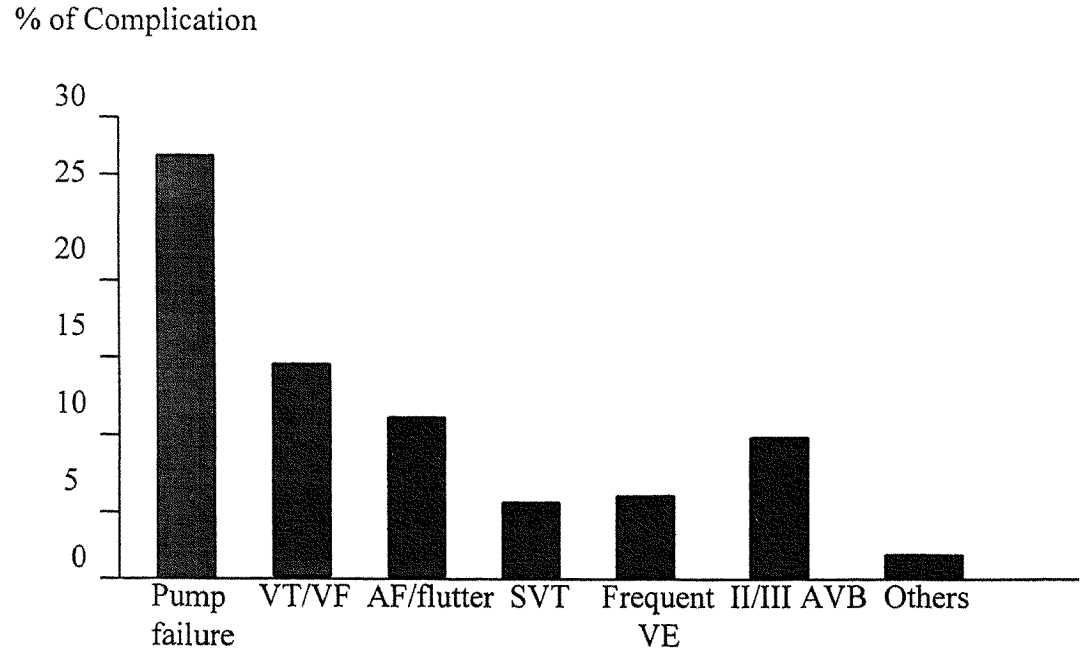

Table 1 - Benefits of short-term treatments for acute myocardial infarction.

Treatment	Problems prevented per 1,000 patients treated
Intravenous beta-blocker	7 deaths
Aspirin	23 deaths
Streptokinase	25 deaths
ACE inhibitors - all patients	5-8 deaths
ACE inhibitors - patients with heart failure	20-30 deaths

Table 2 - Benefits of long-term secondary prophylactic treatment after myocardial infarction

Treatment	Problems prevented per 1,000 patient years of treatment*
Oral beta-blockers	13 deaths / 5 MI
Aspirin	16 deaths / MI / strokes
HMG-CoA reductase inhibitor	6 deaths / 12 MI / 4 CHF / 11 revascularisation**
ACE inhibitor - low LVEF (SAVE)	12 deaths / 9 MI / 16 CHF / 10 revascularisation**
ACE inhibitor - low WMI (TRACE)	46 deaths
ACE inhibitor - heart failure (AIRE)	45 deaths / 26 CHF

Clinical trials: SAVE = Survival and Ventricular Enlargement
TRACE = Trandolapril Cardiac Evaluation
AIRE = Acute Infarction Ramipril Efficacy

MI = myocardial infarction CHF = congestive heart failure
WMI = wall motion index LVEF = left ventricular ejection fraction

* e.g. 200 patients treated for five years.
** revascularisation = coronary angioplasty or bypass surgery

*Table 3 - ACE inhibitor regimens in the large clinical trials. **

	SAVE Captopril	AIRE Ramipril	SMILE Zofenopril	GISSI-3 Lisinopril	ISIS-4 Captopril
Initial dose	6.25 mg test dose	2.5 mg	7.5 mg	5 mg	6.25 mg
	12.5 mg initial dose				
Titration	25 mg tds	2.5 mg bd for 2 days	7.5 mg after 12 hours	5 mg after 24 hours	12.5 mg after 2 hours
	50 mg tds thereafter	5 mg bd thereafter	dose doubled thereafter	10 mg after 48 hours	25 mg 10-12 hours later
				10 mg od thereafter	50 mg bd thereafter
Target dose	50 mg tds	5 mg bd	30 mg bd	10 mg od	50 mg bd
% achieving target dose	placebo 90%	-	placebo 86.1%	control group	-
	captopril 79%	-	zofenopril 78.80%	lisinopril 47.50%	-

* Published trials excluding CONSENSUS-II

INTERVENTION IN CORONARY ARTERY DISEASE

David Sai-Wah Ho

History

1977: Sep 16, 1st Percutaneous Transluminal Coronary Angioplasty (PTCA) performed by Andreas Gruentzig[1].
1983: Approval of 1st PTCA balloon catheters by FDA.
1993: Approval of 1st intracoronary stent by FDA.

Increased experience and improvements in PTCA hardware over the last decade have allowed patients with multivessel disease and complex lesions to be treated[2]. The complexity of cases treated by PTCA has broadened from single, discrete, concentric, noncalcified lesion in a patient with single vessel disease and good ventricular function to multiple, diffuse, eccentric, calcified lesions in a patient with multivessel disease and poor ventricular function[3,4]. Over the last 5 to 10 years, number of PTCA performed has increased markedly and has exceeded CABG in most countries[5,6].

In the USA, number of PTCA cases performed has overtaken CABG since 1987 (around 200,000 cases in 1987). In 1995, around 460,000 PTCA cases were performed.

In Australia, number of PTCA cases performed has overtaken CABG since 1993 (around 10,000 cases in 1993). In 1995, around 13,000 PTCA cases were performed.

Despite the improvements in hardware and operator experience, there remain 3 major limitations:

1. Failure to cross some lesions, particularly chronic total occlusion.
2. Acute closure.
3. Restenosis.

Mechanism

Increase in luminal diameter is due to expansion of both the inner and outer diameters of the vessel (thus, a tendency to elastic recoil)[7,8]. This "controlled injury" led to "cracking" of calcified or densely fibrotic plaque. "Over-cracking" may result in a dissection with an irregular luminal surface. This has several consequences:

1. Exposure of subintimal tissue (eg. collagen) will lead to adhesion of platelets and clotting proteins[9].
2. Release of potent mitogens (PDGF) may lead to excessive local smooth muscle cell proliferation, resulting in restenosis over the subsequent 3 to 6 months[9].
3. When a dissection is extensive, excessive platelet activation and thrombus formation may lead to acute vessel closure, the most common cause of major complications associated with PTCA[10].

Success Rates

Depends on definition and other factors (patients, vessel and lesional characteristics).

A common definition is a residual stenosis of < 50% (angiographically), without any major in-hospital complications (eg. death, MI, CABG).

In the NHLBI Registry I (1979-81)[3]: success rate was 65%. In the NHLBI Registry II (1985-86)[4]: success rate was 85%. In most current series, success rate is around 90-95%. The most common cause of failure is due to inability to cross the target lesion with a guidewire or balloon catheter.

Complications

Risks associated with PTCA include all those associated with diagnostic coronary angiography plus a few others[11]:

- Myocardial infarction (MI)
- Urgent surgery (CABG, tamponade, aortic or other vascular complications)
- Death (AMI, cardiogenic shock, arrhythmia, tamponade, aortic dissection, stroke)
- Vascular complications (hematoma, pseudoaneurysm, AV fistula, wound infection, ischemic limb)
- Renal impairment (transient, ATN)
- Stroke

Acute closure occurs in around 2 to 8% of patients undergoing PTCA and accounts for most of the major in-hospital complications (death, MI, CABG)[12,13]. Around 80% of the cases occur within 15 minutes of last balloon deflation. The remainder occur within 24 hours. Before the availability of the intracoronary stent, around 35% would require emergency CABG, 40% would sustain a myocardial infarction and 4% would die in-hospital[14,15]. Efforts to improve the safety of PTCA have centered on the prevention, reversal or management of acute closure.

The intracoronary stent has largely reduced the complications associated with acute vessel closure and the need for urgent CABG[16,17]. The coronary stent has also been shown to be effective in reducing restenosis in several randomized studies[18,19,20]. A major problem with stent is stent-thrombosis within the first 2 weeks post stenting, resulting in death or myocardial infarction[17,18,19,21]. Aggressive anticoagulation in an attempt to prevent thrombosis has led to significant bleeding and puncture site complications[17,18,19,21,22]

Attention to the technical details of stents placement, sizing and supplemental inflation to achieve a smooth lumen have reduced the incidence of stents thrombosis[23,24,25,26]. These approaches to reduce stent thrombosis have allowed a reduction in the degree of anticoagulation and even eliminated the need for anticoagulation in certain patient subgroups, leading to a reduction in bleeding complications and hospital stay[23]. Although these may increase the popularity of the stent, decision to use the stent should still be a rational balance between cost and potential complications on the one hand and proven clinical benefit on the other[27,28].

Other devices like the laser, rotational and directional athrectomy devices have each got its own advantage in certain subsets of lesions. Except for stents, none of the new devices have been shown to reduce restenosis, while some are associated with an increased incidence of procedural complications.

Restenosis

The incidence of restenosis depends on the definition used and the measurement technique employed. Most studies define restenosis as more than 50% narrowing of the diameter of the lumen at the site of previously successful PTCA.

Around 20-25% of patients redevelop evidence of ischemia at 6 months following PTCA[29]. If routine follow up angiogram is performed in 4-6 months, an additional 10-15% of patients will demonstrate restenosis. Certain groups of patients are more prone to restenosis. For example, in the male with unstable angina and proximal LAD stenosis, the incidence of restenosis is around 40%. Restenosis is partly due to elastic recoil, and partly due to local smooth muscle cell proliferation. Most cases respond well to 1 or more repeat dilatations.

Clinical Indications for PTCA

Significant stenosis of one or more major epicardial arteries, which subtend at least a moderate-size area of viable myocardium, in a patient who has:	**Potential absolute or relative contraindications to PTCA:**
· Recurrent ischemic episodes after myocardial infarction or major ventricular arrhythmia · Angina which has not responded adequately to medical therapy · Clear evidence of myocardial ischemia on resting, ambulatory, or exercise electrocardiography · Objective evidence of myocardial ischemia which increases the overall risk of required noncardiac surgery	· High-risk anatomy, including significant left main disease in which vessel closure would likely result in hemodynamic collapse · Severe, diffuse, and or extensive coronary artery disease better treated surgically · No coronary stenosis greater than 50% diameter reduction · No objective or compelling clinical evidence of myocardial ischemia

The decision to perform PTCA must take into account:

1. Patient's overall condition (age, LV function, other medical problems, prior surgery etc.)
2. Lesion and vessel characteristics.
3. Capabilities of the operator and equipment; availability of on-site surgical back-up.

Available data regarding results of PTCA and alternative management options must be considered. The anticipated success and safety factor should compare favorably with the alternate medical and surgical treatment. In some situations, this may be straightforward. In other situations, an optimal decision may require detailed discussion and film review by senior PTCA operators and cardiac surgeons[30].

PTCA vs Medical Treatment in patients with single-vessel disease and stable angina

PTCA:

Relieves angina more effectively?	Yes[31]
Reduces the need for antianginal medications?	Yes[31]
Improves exercise performance?	Yes[31]
Improves "quality of life"(in both physical and psychological measures)?	Yes[32]
Was associated with a higher incidence of MI and emergency CABG?	Yes[31]
Improves resting LV systolic performance?	No[31]
Reduces incidence of MI?	No[31]
Improves survival?	No[31]

PTCA in Multivessel Disease

As discussed earlier, PTCA was initially used only in patients who had discrete stenoses in the proximal portion of a single coronary artery[8]. With the improvements in hardware and technique, patients with stenoses that are more

complex, located in distal arterial segments, or present in more than one artery are being treated by PTCA. Despite the increased application of PTCA, its complication rate has remained reasonably low. For elective PTCA, the risk of death is ≤1%, MI 2-4%, emergency CABG 1-2%[33].

CABG vs Medical Therapy

CABG:

Relieves angina more effectively Yes[34]
Reduces the need for antianginal medications? Yes[34]
Improves survival?
Only for those with extensive disease[34]
Reduces the incidence of MI? No[34]
Improves LV function? No[34]
Increases the likelihood of a return to gainful employment? No[34]

Operative mortality is around 1% in low risk patients when performed electively[35].

Efficacy of CABG declines after 7-10 years, due to degeneration of saphenous vein grafts and progression of atherosclerosis in native vessels[36,37].

PTCA vs CABG in Multivessel Disease {from published randomised trials: RITA[38] (n=1011) f/u 2.5 yrs., EAST[39] (n=392) f/u 3 yrs. and GABI[40] (n=359) f/u 1 yr.}

PTCA	CABG
Similar incidences of "death or MI" at follow up Similar improvements in exercise capacity In-hospital deaths: 0 8[38]-1.1[40]% for PTCA vs 1 0[39]-2 5[40]% for CABG	
· More likely to have persistent angina[38,40]* · More likely to require antianginal medications[38,39,40] · More likely to need another revascularisation procedure (38-44% vs 11-14%)[38,39,40]	· More in-hospital Q-MI (8.1-10.3% vs 2 3-3%)[39,40] · More stroke, pneumonia, wound infection, redo sternotomy for bleeding, pulmonary embolism · Longer hospital stay (median 12-19 days vs 4-5 days)[38,40]

*GABI showed equivalent improvement in angina

CABG will remain the preferred revascularisation procedure for some patients with multivessel disease:

1. Left main coronary artery disease.
2. Chronic occlusion.
3. Complex stenoses.

Choice of Therapy	Medical	CABG	PTCA
· Patients with 1VD	√	-	√
· Patients with 2VD, 3VD (not involving the proximal LAD) and who has normal LV systolic function	√	√	√
· Patients with LMCA disease, or multivessel disease involving the proximal LAD, or 3VD with impaired LV function	-	√	?

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SURGERY IN CORONARY ARTERY DISEASE

Guo-Wei He

Surgery in coronary artery disease includes coronary artery bypass grafting (CABG), tranmyocardial revascularization (TMR), and treatment for complications of coronary artery disease such as left ventricular aneurysm and ventricular septal defect following myocardial infarct. This lecture focuses on the most commonly performed coronary surgery — CABG.

The development of direct coronary artery surgery is one of the outstanding achievements in the history of cardiac surgery [1]. Properly performed coronary artery bypass results in immediate and predictable improvement in myocardial blood flow in the majority of patients. This increase in myocardial blood flow results in relieve of anginal symptoms, increased exercise tolerance, freedom from medications, and overall improvement in the quality of life. In many patients coronary bypass clearly improve survival.

Coronary artery surgery was greatly expanded in 1970s. In 1980s, the development of percutaneous transmural coronary angioplasty (PTCA) greatly affected the patient population for surgery. Together with aging population and increased number of reoperation, in 1990s, there is a continuing trend toward that surgical candidates are older, have more extensive coronary disease, worse ventricular

function, more severe coexistent medical problems, and more likely to be reoperative.

Diagnosis of Coronary Artery Disease

1. Noninvasive methods

1) Exercise Stress Test. This is a valuable technique for assessing myocardial ischemia.
2) Echocardiography. This is valuable for the evaluation of ventricular function and wall motion.
3) Nuclear Cardiology. Myocardial blood flow can be assessed using thallium perfusion scans. Regional and global ventricular function can be studied.
4) Positron Emission Tomography (PET). This is valuable in identifying injured but viable myocardium potentially salvageable by revascularization.

2. Coronary Arteriography

This is the definitive method for diagnosis. It should include arteriogram for all major vessels and left ventriculogram. Selective coronary arteriography has made possible the modern era of coronary artery surgery [2]. It can demonstrate the extent, severity, and location of coronary artery

stenoses and the quality and size of the distal coronary arteries. Ventriculography demonstrates the global and segmental function of the left ventricle. Proper assessment of the location and severity of arterial stenosis, the size and quality of the distal vessel, and the ventricular function is necessary to determine operability, risk, and possible results.

Indications for CABG

Consideration of operative indications should be based on what the patient can benefit from with comparison to medical therapy or PTCA or other interventional techniques. The choose of the therapy should be based on

1) relieving angina pectoris;
2) preventing myocardial damage and serious ventricular arrhythmias, and
3) preventing cardiac death.

Surgical treatment, interventional procedures, and medical treatment are often complementary. Careful analysis on individual patients is important to achieve good results. Properly performed coronary bypass surgery means: elective or urgent CABG in patients with suitable size (adequate size of distal vessels may be difficult to determine in the Chinese population because in many occasions coronary vessels are smaller) and quality (mild or no atherosclerotic involvement distally) of distal vessels, suitable ventricular function (ejection fraction over 25%), and no major associated disease. In those patients, CABG is expected to have low mortality.

1. Chronic stable angina. This is a common indication. CABG provides effective, predictable relief of angina in the vast majority of patients.

   Unstable angina. Angina of sufficient severity warrants admission to an intensive care unit to rule out myocardial infarction and the occurrence of transient electrographic changes, with ST-T segment and/or T-wave changes, during episodes of pain [3]. In those patients, aggressive medical management will result in control of angina in almost all patients. Following medical stabilization of those patients, elective coronary arteriography should be performed. Decision regarding CABG or PTCA is made on the clinical picture and the angiographic findings. Surgical therapy during or following unstable angina results in better relief than medical therapy with excellent survival (90% at 24 months).

2. Acute myocardial infarction (AMI). The development of thrombolysis and PTCA have decreased the necessity of CABG on the treatment of AMI. CABG are recommended for the following conditions: 1) uncomplicated infarction; 2) infarction with extension; 3) subendocardial infarction; 4) infarction with persistent angina; 5) infarction with refractory ventricular arrhythmias; and 6) infarction with hemodynamic impairment or cardiogenic shock.

3. Acute failure of PTCA. Surgical standby has been the practice for PTCA. Acute dissection of coronary arteries requires emergency CABG and the incidence is 3-7% [4].

   Severe anatomic disease. Anatomic extent of coronary disease correlates with fatal cardiac events more significantly than the degree of angina does. Severe anatomic disease such as left main stenosis is associated with poor survival that can be greatly

improved by CABG. Therefore, in this group of patients, CABG is indicated even without symptoms.

Coronary disease combined with valve operation. Valve surgery in the presence of untreated coronary disease has higher early and late mortality than in the absence of coronary disease [5-8]. It is recommended to perform coronary arteriography in all patients over 40 years who undergo valve surgery.

4. Postoperative recurrent angina. This could be due to graft occlusion, progression of native coronary arteries, or both [9].

Surgical Strategy and Technique

1. Choose of grafts.
   Saphenous vein (SV): large diameter, easy handling, but higher late occlusion.

   Arterial grafts:
   Internal mammary artery (IMA): adequate diameter under most situations [10,11], higher patency (>90% at 10 years) [12-14].

   Radial artery: adequate diameter; spastic artery requiring pharmacological treatment [15]; long-term patency to be determined and could be better than that of the veins.

   Other arterial grafts [16-19]: gastroepiploic artery, inferior epigastric artery, subscapular artery, splenic artery.

   In my practice, I usually use left IMA for LAD, SV or radial artery for other vessels.

   Myocardial preservation. Two major methods are used: cold cardioplegic arrest and intermittent aortic cross-clamping. Brief description of technique. The procedures of CABG involve: median sternotomy, with/without dissection of IMA or other grafts (SV grafts from legs), cardiopulmonary bypass (aortic cannula and single venous cannula), moderate hypothermia (28°C), cardioplegic arrest and topical cooling, distal (individual or sequential) anastomoses, release of aortic cross-clamping and resuscitation of the heart, proximal anastomoses (aorta to grafts), off bypass, hemostasis, and closure of the sternotomy.

2. Postoperative management. Patients usually stay in intensive care unit (ICU) for one night and extubated either the same day or the next morning. Treatment of possible low cardiac output, hypertension, arrhythmia, bleeding and other complications may be required. Early aspirin therapy is necessary.

Results of CABG

CABG in large patient population has achieved excellent long-term results although graft patency is still a major concern.

1. Graft patency. The patency of Left IMA is more than 90% at 10 years [12,14]. In contrast, vein graft occlusion could be as high as 50% at 10 years. Proper control of risk factors, use of arterial grafts may decrease the incidence of reoperation.

2. Freedom from the following event [20]: angina (60% at 10 years), MI (96% at 5 years and 64% at 15 years), sudden

death (97% at 10 years), failure to work (80% of patients who are not working before CABG return to work after operation).

3. Quality of life: Most surviving patients have a satisfactory quality of life early after CABG and it declines with time, similar to the freedom from angina.

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Symposium 3

Lipid Metabolism and Disorders

LIPID DISORDERS

E.D. Janus

The Atheromatous Plaque-

Starting in childhood fat, particularly cholesterol, is deposited in the wall of the artery underneath the pavement like endothelial lining. The resulting lesion is called a "fatty streak". With time and the deposition of further cholesterol a fibrous plaque forms consisting of cholesterol in the core surrounded by macrophages and abnormal smooth muscle cells. This plaque is covered by a "fibrous cap". As a result the artery becomes narrowed and stable angina may result. If the plaque ruptures i.e. tears then the cholesterol and other debris is released into the lumen of the artery. This triggers thrombosis and causes unstable angina or myocardial infarction.

The Role of Lipids and Other Risk Factors

If the plasma cholesterol is very low (below 3.5 mmol/litre), as in healthy children and also in the rural adult populations in poorer countries then this process does not occur. Once the cholesterol levels rise above 4.0 mmol/litre, the levels found in young Hong Kong adults, the process of lipid deposition starts. Cholesterol levels above 5.0 mmol/litre are common by middle age in Hong Kong adults and cholesterol levels rise further with age, high fat diets, obesity and, in women, after menopause. In some families cholesterol levels are very high up to 8-10 mmol/litre. The higher the cholesterol the faster the deposition of fat in the arteries.

There are in fact two major forms of cholesterol in the blood: low density lipoprotein cholesterol (LDL-cholesterol) which is harmful and ideally should be below 2.5 mmol/litre and high density lipoprotein cholesterol (HDL cholesterol) which is protective so that higher levels are better. Levels of HDL cholesterol below 1.0 mmol/litre are undesirable and levels of around 1.5 mmol/litre (more common in women than in men) are ideal.

All of this knowledge has come from comparing patients with heart disease with healthy individuals, from comparing the diet and cholesterol levels in countries with varying levels of heart disease, from long term follow up of individuals with varying levels of cholesterol, LDL cholesterol and HDL cholesterol and from animal studies. There is increasing evidence that high triglycerides may also be harmful especially if the patient has high LDL or low HDL cholesterol levels as well.

Other Risk Factors

Cigarette smoking, hypertension and diabetes are also well recognized risk factors for coronary heart disease. While coronary heart disease is uncommon if the cholesterol is low in such individuals it becomes a major problem once cholesterol levels rise. Multiple risk factors are common and such individuals do much worse than those with only one risk

factor. Increasing age, male sex and a family history of CHD before age 60 are also risk factors but these cannot be modified.

Lipid Lowering Intervention

It is well known that lowering the cholesterol, and especially the LDL cholesterol, in healthy individuals with high levels reduces the number of cardiac events (acute myocardial infarction, CHD death and angina) over the next 5-10 years in such individuals. For this reason it is important to keep cholesterol levels down in the community by prudent diet and avoiding obesity. For healthy (CHD free) individuals with high cholesterol levels, other risk factors or a bad family history of CHD cholesterol lowering is also useful. This is called **primary prevention.** In all cases dietary modification, weight reduction, exercise and avoidance of smoking are crucial. If despite this the cholesterol level remains above 6.2 mmol/litre lipid lowering drugs may be considered.

For a long time it was believed that once CHD had developed lipid lowering **(secondary prevention)** would have only a limited benefit as the plaque would not be reversible. Over the last 10 years numerous angiographic studies have shown that in fact lipid lowering by diet and or drugs can stop the further progression of the plaques and even cause them to shrink. This occurs especially if the LDL cholesterol can be reduced below 3.0 mmol/litre. Even more striking is the reduction in further CHD events such as myocardial infarction, death from CHD, the need for angioplasty or coronary artery bypass surgery. There is evidence that LDL lowering facilitates removal of lipid from existing plaques, makes them more stable (i.e. less likely to rupture) and improves the function of the endothelial lining of the artery reducing the tendency to vasospasm. The benefits of secondary prevention have now been shown to occur in both men and women and up to age 70 years.

Thus secondary prevention has taken on a new importance. Both diet and drugs have a useful place. For 100 individuals with CHD and high cholesterol levels treated with simvastatin in the recent 4S study the benefits were very dramatic. Over a 5 year period only 5 instead of 9 died (4 lives were saved), only 14 instead of 21 had non fatal AMI (7 less) and only 13 instead of 19 needed PTCA or coronary artery surgery (6 less).

Measurements of Lipids and Lipoproteins

It is usual to measure cholesterol, triglycerides and HDL cholesterol levels. The LDL level can then be calculated:

LDL-Chol = Total Chol - HDL Chol - triglycerides/2 2

This is valid provided the triglycerides are below 4.0 mmol/L.

While cholesterol levels do not change much after eating (daily cholesterol intake is around 400 mg/day) triglyceride levels increase markedly after meals (daily triglyceride intake is around 90 grams/day). For this reason blood lipids are usually measured after a 12-14 hour overnight fast.

During acute illness, e.g. flu or after a myocardial infarction, cholesterol levels drop and triglyceride levels rise. As a result the levels are still informative if blood is taken within 24 hours of an acute myocardial infarction (i.e. on the first morning) but there is no point in taking them later. If this initial opportunity is missed it is best to wait till 3

months after the illness episode before taking a sample for blood lipids.

A further problem is whether the lab measures the lipids accurately (i.e. they are not reported consistently lower or higher than the true values) and precisely (i.e. giving consistently similar results if the same sample is analyzed repeatedly). There are clear analogies with blood pressure measurements.

Good labs can measure cholesterol with a 3% c.v. That means that if the true

cholesterol is 5.0 repeated tests will come out between 4.7 and 5.3 mmol/L. Excellent labs would provide values from 4.8 to 5.2 mmol/L. Because cholesterol levels vary from day to day and week to week (again like BP's) variations of ±10% from the previous value are quite common i.e. a value of 4.5 today and 5.5 next week does not mean the patient is much worse. For this reason it is necessary to measure at least twice before starting or changing treatment - again much like BP.

For triglycerides, HDL cholesterol and LDL cholesterol there are even greater variations encountered.

Dietary and Drug Therapy

Weight loss and exercise help to improve lipid levels as does a prudent diet i.e. avoidance of excess animal fat, and the liberal use of fruit, vegetables and carbohydrates. The extent to which they lowers cholesterol various from 10-25% depending on the individual's genetic make up and how carefully he diets. If the cholesterol levels are still too high despite diet it may be necessary to add lipid lowering drugs but diet should continue lifelong. The criteria for using drugs and the appropriate choices are outlined on the QMH "agreed indications" handout.

Indications for Lipid Lowering Therapy
Queen Mary Hospital - May 1995

Use diet first. Use mean of two measurements (cholesterol, triglycerides, HDL-cholesterol and calculated LDL cholesterol) before starting drug treatment.

(1) **Known coronary heart disease**	cholesterol >5.2 mmol/L **and /or** HDL-chol <1.0
(2) **Peripheral vascular disease** Family history of coronary heart disease before 60 Year Familial hypercholesterolaemia Hypertension Diabetes mellitus Ischaemic stroke	Cholesterol >6.2 mmol/L **or** Cholesterol >5.2 mmol/L and HDL Cholesterol <1.0 mmol/L
(3) Patients with high lipids only and none of the other features above	cholesterol >7.5 mmol/L **or** triglycerides >10.0 mmol/L

Be more conservative for **Premenopausal women**
Patients over 75 years old

Choice of Medication

High cholesterol	**Combined hyperlipidaemia**	**High triglycerides**
Statins Fluvastatin, Lovastatin, Pravastatin, Simvastatin Resins cholestyramine	If mainly ↑ cholesterol (trigs <3 mmol/L) use statins If mainly ↑ trigs (>3) use fibrates If both high use fibrate one add resin later if necessary	Fibrates Bezafibrate, Fenofibrate, Gemfibrozil Fish oils

Combination Therapy

Statins with resins	-	compatible
Fibrates with resins	-	compatible
Fibrates with statins	-	use this combination with caution

Low dose statin e.g. simvastatin 10 mg nocte plus low dose resin e.g. cholestyramine 4-8 g (1-2 sachets) daily is very effective.

NON-PHARMACOLOGICAL TREATMENT

Wai-Suen Leung

Dietary Therapy

Principles

The objectives in the management of hyperlipidaemia vary according to the type of hyperlipidaemia and its severity. For the majority of cases, the main theme is to decrease atherogenic lipoproteins such as VLDL, IDL and LDL, and increase anti-atherogenic HDL, so as to minimize the risk of coronary artery (CAD) or other vascular disease. Various set of guidelines have been proposed for the treatment of dyslipidaemia in the primary and secondary prevention of CAD. One good example which is easy to follow is the guidelines set by the NCEP ATP II of USA (Table 1) [1].

Dietary change should always be tried first in the management of dyslipidaemia, accompanied by control of other risk factors such as obesity, smoking and physical activity. Often diet alone will be successful in controlling hyperlipidaemia. Ideally, dietary advice should be provided by a qualified dietitian or nutritionist, who will start by assessing the patient's intake of total energy, protein, carbohydrate and fat, including its P:S ratio and cholesterol content. The dietitian will then advise on the quantitative and qualitative changes in diet needed to achieve ideal body weight and optimal serum lipids.

NCEP and EAS Recommendations

NCEP Step 1 and Step 2 diets (Table 2) are considered suitable for treating all types of hyperlipidaemia with the exception of type I, where more drastic restriction of fat intake may be necessary. Step 1 diet is recommended for the general public as well as any hyperlipidaemic patient without CAD not adopting this diet. If the diet proves inadequate, the patient should proceed to the Step 2 diet. Patients with established CAD should begin immediately on the Step 2 diet. EAS diet [2] is very much like the NCEP Step 1 diet. Besides, it also emphasises the importance of consuming around 35 gm of fibre per day.

Table 3 shows the differences between an average British diet as shown by the 1973 National Food Survey and a simplified typical modified fat diet as recommended above. These modified diets contain less total fat, saturated fat and cholesterol, and more polyunsaturated fat. Protein intake is kept fairly constant so that relatively more of the total energy intake is derived from carbohydrate. Use of such diets has resulted in mean reductions in serum cholesterol of between 5% [3] and 15 % [4]. This effect is usually evident within 3 months. Effect of diet on cardiovascular morbidity and mortality has also been addressed by various dietary intervention

trials in both primary and secondary preventions.

Data for Asian Countries

Data for dietary intervention in Asian Countries is sparse. At the moment we are conducting a small prospective study in PMH looking into the effect of Step 2 diet in Chinese patients with established CAD. Until now 16 patients have completed diet for 3 months. The mean reduction of serum cholesterol is 11% (range -2% - 22%). The study is on-going.

Unsaturated Fat & P:S Ratio

In general, saturated fats (SFA) raise the serum cholesterol and polyunsaturated fats (PUFA) cause it to decrease (Table 4). Thus, the fatty acid composition of food is often described in terms of the P:S ratio. In general, meat and dairy products have low ratios whereas most fish and vegetable sources of fat have high ratios, except coconut oil (P:S ratio of 0.02). Margarines differ markedly, from 0.13 (hard variety) to 2.00 (soft variety). Cooking fats varies: 0.32 for lard to 4.82 for corn oil. The chief benefit of PUFA is due to changes in LDL cholesterol concentration. Turnover studies suggest that LDL synthesis is reduced and fraction catabolism enhanced.

n-3 PUFA receives extensive investigations ever since it was reported Eskimos, a population with lower CAD and a very high intake of n-3 PUFA (fish oil), have an anti-atherogenic lipid pattern. n-3 PUFA is now considered a drug under trials for the management of acute coronary syndromes and post-PTCA stenosis [5].

Monounsaturated fats (MUPA) was originally thought to be neutral. There are two forms of MUFA, *cis*- and *trans*-. *Cis*-MUPA has now been shown to be probably equally effective as PUFA, and without the undesirable reduction in HDL cholesterol as shown by PUFA [6]. Indeed, MUFA- enriched diets have been advocated to replace high-carbohydrate diets to prevent CAD. *Trans*-MUPA, which can be a major constituent of hydrogenated ('hardened') fats, including margarines, behaves more like a saturated than a mono-unsaturated fatty acid.

Dietary Cholesterol

The cholesterol-lowering effect of reducing dietary cholesterol is debatable, unless the intake is very high [7], but it makes sense to patients whereas a negative attitude is confusing. An interesting study where normal subjects consumed an extra egg per day for 3 months and thus increased their daily intake of cholesterol from 300 to 550 mg showed no effect on total serum cholesterol. Other studies, however, showed a significant correlation. One of the main difficulties is the considerable variability of response between individuals.

Dietary Fibre

Dietary fibre ranges from insoluble fibrous substances like cellulose to water-soluble amorphous gels and gums. Insoluble dietary fibre passes through the GI tract with minimal impact . In contrast, soluble dietary fibre exerts its main effect in the small intestine where its viscosity can interfere with digestion or absorption. Over 200 published human trials have led to the general conclusion that food or ingredients

rich in soluble fibre may lower plasma cholesterol directly. These include citrus pectin (a food additive used for thickening jams), guar gum (from the seeds of a leguminous plant; also used in DM) and psyllium (a mucilage from the seeds of Plantago ovata). They cause an increase in faecal bile acid excretion and thereby exert a cholesterol-lowering effect. The average reduction in the plasma cholesterol level is about 8-12%. The average dose of each type of fibre is about 15-25 g/day in divided doses with meals [8].

Vegetable Protein

Several studies have shown that substituting vegetable protein for animal protein in the diet results in a fall in serum cholesterol, despite the fat and cholesterol content of the diet being kept constant [9]. Substitution of soyabean protein for animal protein led to a 25% decrease in serum cholesterol in type II hyperlipidaemic patients. The mechanism is uncertain, but the observation might explain why some populations in the Far East have lower serum cholesterol levels than would be expected from the fat and cholesterol content of their diet.

Antioxidant vitamins

Antioxidant vitamins such as Vitamin E & C when given in high doses can reduce oxidative modification of LDL, thus reducing its atherogenicity. Considerable epidemiological and biochemical evidence has accumulated in support of this hypothesis. However, the only prospective clinical trial of antioxidant vitamins in smokers has failed to show any benefit in the prevention of myocardial infarction [10].

Special Foods

Randomized controlled trials on garlic powder strongly suggest that garlic has both lipid-lowering and cardio-protective effects [11]. Nuts, such as walnuts, which are rich in MUFA & vitamin E, are promising as a new protective food against CAD [12]. Filtered (brewed) coffee may be better than unfiltered (boiled) coffee because coffee contains natural lipid-raising substances which can be filtered out [13].

On the other hand, whether decaffeinated coffee is more protective to the heart than caffeinated coffee is still under debate [14]. The intake of tea may be protective against CAD by its flavonoid content (a strong antioxidant), but again further work is needed [15]. Alcohol has a cardioprotective effect as confirmed by many prospective studies, in the order of 40-60% reduction in risk among light-to-moderate drinkers [16]. The best documented mechanism is through elevation of HDL.

Control of Other Risk Factors

Physical Exercise

Numerous studies have shown that moderate amounts of aerobic exercise (walking, jogging, swimming or cycling) on a regular basis have beneficial effects on serum lipids. These include reductions in triglyceride and LDL, and increases in lipoprotein lipase activity and HDL. Significant effects were observed within 2 months in middle-aged men exercising for 30 min thrice weekly [17]. The lipid modifying effect of excercise are accentuated by dietary modification. Whether exercise or diet exerts the dominant effect depends largely on the level of exercise achieved and the total energy

balance. Thus, to obtain valid information, future research must account for variables such as exercise protocol, fitness status, and dietary regimen [18].

Obesity

Obesity is a prime cause of hyperlipidaemia, especially hypertriglyceridaemia. It is essential to weigh all patients at their first attendance and to indicate the extent to which their weight differs from the ideal value. Apart from body mass index, waist-hip ratio is another parameter of obesity earning popularity. It has been shown that dietary fat : carbohydrate ratio is important in relation to body weight. A higher percentage of energy derived from fat is positively associated with obesity, the main reasons being higher energy density and palatability of fat [19].

Radical Therapy

Principles

Radical methods of treatment should only be used after conventional therapy fails to control hyperlipidaemia. In general the use of these techniques will be restricted to patients with severe FH, although exceptions do occur.

Extracorporeal Removal of Lipoproteins

Plasma exchange was first used to treat FH in 1974. 3- to 4-litre exchanges with 4.5% human albumin solution performed weekly or twice monthly over periods of 5-15 years have been shown to slow the rate of progression of atheroma in FH homozygotes, and significantly prolongs life expectancy [20]. LDL apheresis, which means selectively removing LDL (and VLDL) from plasma, while leaving HDL in behind, was introduced in 1976. It includes a cell separator and a column or device containing chemical affinity materials such as dextrans and antibodies, or precipitants such as heparin. A 3 h procedure will achieve an immediate 60-70% reduction and a time-averaged 40-60% reduction of LDL [21]. Several prospective trials that include angiographic endpoints have been completed, all showing impressive biochemical and clinical improvement. Lp(a) removal is another promising application of LDL apheresis, since standard diet and drugs do not reduce Lp(a) levels. Use of LDL apheresis in patients with less severe hypercholesterolaemia after diet and drug therapy is uncertain.

Surgical Procedures

Partial ileal bypass involves bypassing the terminal one-third of 200 cm of the ileum, whichever is the greater. This diverts the intestinal contents away from the sites of absorption of both vitamin B_{12} and bile salts. The chief indication for bypass is patients with heterozygous FH who are intolerant of or resistant to lipid-lowering drugs. With the advent of HMG CoA RI, nowadays only a few patients qualify for the operation. Anyway, the famous POSCH trial (Program on Surgical Control of the Hyperlipidaimias) showed that bypass significantly reduces CAD [22]. But in a significant percentage of patients the operation need to be reversed because of persistent diarrhoea or recurrent abdominal pain. Partial ileal bypass has proved useless for FH homozygotes.

The first successful liver transplantation from a normal donor into a FH homozygote was reported in 1984. Serum cholesterol can come down from the range of 25 mmol/L to within normal [23]. This is the most definitive treatment for homozygous FH but it is not without risks, including the long-term use of cyclosporin for immunosuppression.

Gene Replacement Therapy

Gene therapy for FH is still in its premature state although the concept is sounding. One of the techniques is *ex vivo* transfection of hepatocytes of a FH homozygous patient (obtained from partial hepatectomy) with LDL receptor-DNA and their subsequent re-injection into the portal vein [24]. The uptake of these hepatocytes by the liver will allow LDL receptor functioning. So far the result is disappointing. Further modifications such as *in vivo* approach is on the way.

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Tables

Table 1:
National Cholesterol Education Program cutpoints for LDL cholesterol

Risk category	Initiation levels for diet therapy (mmol/L)	drug therapy (mmol/L)	Minumum therapeutic goal (mmol/L)
Without CAD & with < 2 risk factors	≥ 4.1	≥ 4.9	< 4.1
Without CAD & with ≥ 2 risk factors	≥ 3.4	≥ 4.1	< 3.4
With CAD	≥ 2.6	≥ 3.4	< 2.6

Table 2:
NCEP dietary therapy of hypercholesterolaemia

Nutrient	Step 1 diet	Step 2 diet
Total fat*	Less than 30%	Less than 30%
Fatty acids*		
Saturated	Less than 10%	Less than 7%
Polyunsaturated	Up to 10%	Up to 10%
Monounsaturated	10-15%	10-15%
Carbohydrates*	50-60%	50-60%
Protein*	10-20%	10-20%
Cholesterol	Less than 300 mg/day	Less than 200 mg/day
Total calories	To achieve and maintain desirable weight	To achieve and maintain desirable weight

* per cent of total caloires

Table 3:
Comparison between an average British diet and a typical modified fat diet

	British diet (in 1973)	Modified diet
Total calories per day	2400	2000
Carbohydrate*	46%	52%
Protein*	12%	16%
Fat*	42%	32%
P:S ratio	0.23	1.5
Cholesterol	500 mg	less than 300 mg

* per cent of total caloires

Table 4:
Dietary Determinants of plasma lipids

'Unfavourable' or 'Possibly unfavourable' effects	
SFA (especially C12:0, C14:0, C16:0)	↑↑↑LDL cholesterol
Trans-MUFA	↑↑LDL cholesterol, ↓HDL cholesterol
Dietary cholesterol	↑LDL cholesterol, when fed in large amounts with high SFA intake
*Fibre-depleted complex carbohydrates	↑VLDL, ↑triglyceride, ↓HDL if carbohydrate comprises 60% or more of total energy
*Sucrose	↑VLDL, ↑triglycerides if taken in large amounts (>140 g/day) and with high SFA
'Beneficial' effects	
Cis-MUFA (C18:1)	↓↓LDL cholesterol
Soluble dietary fibre	↓LDL cholesterol
'Beneficial' and 'possibly unfavourable' effects	
n-6 PUFA (C18:2)	↓↓LDL cholesterol, ↓HDL cholesterol if taken in large amounts
n-3 PUFA (C20:5, C22:6)	↓↓VLDL, ↑LDL, especially in hyperlipidaemia
* Effect possibly transient	

DRUG THERAPY OF HYPERLIPIDAEMIA

C. R Kumana

The following account is divided into three sections. The first, describes the principal types of hyperlipidaemas (also known as hyperlipoproteinaemias) and the respective antilipidaemic drug categories used in their treatment. The second, is a concise, simple, explicit and uptodate set of guidelines for the drug treatment of patients with the corres- ponding hyperlipidaemias, based on evidence from clinical trials and cost effectiveness considerations. The final section, briefly details some of the important adverse/side effects and drug interactions pertaining to these agents and certain other concerns. The all important clinical trials themselves are not reviewed, as they are covered in a separate account. Cost effectiveness considerations refer to current (January 1996) Hong Kong Public Hospital costs of individual agents which may not be applicable in other settings, as in other countries and in subsequent months and years. Moreover, all guidelines are prone to modification as more evidence becomes available from ongoing and future clinical trials.

Types of Hyperlipidaemias & Corresponding Drug Treatment Categories

In the blood lipids are transported as globular, high molecular weight, lipoprotein articles. These take the form of a non-polar core (*triglycerides* and *cholesterol esters*), and a polar envelope consisting of *phospho-lipids, unesterified cholesterol* and a variety of different *apoproteins.* Depending on the

apoproteins projecting from its surface, the particle binds to specific receptors/enzymes in different tissues where it undergoes further metabolism. Dietary fat from the gut enters the blood mainly as **chylomicrons** (largely triglycerides). The latter are the least dense and by far the largest of the lipoproteins. These particles are progressively modified by metabolism in various tissues including the liver, and become progressively more compact and more dense. Thus, successively they give rise to **VLDL** (Very Low Density Lipoprotein) mainly consisting of *triglycerides*, **IDL** (Intermediate Density Lipoprotein) consisting of *triglycerides* and *cholesterol esters*, and the largely cholesterol ester containing **LDL** (Low Density Lipoprotein) and **HDL** (High Density Lipoprotein) particles.

Among these, most attention has been focused on the latter two particles. LDL may be regarded as a "Life Degrading Lipoprotein", whereas HDL may be considered to be a "Highly Desirable Lipoprotein", which correspondingly appear to increase and reduce the respective risk of atherosclerosis. In particular, LDLs contribute to atheromatous plaques and disturb endothelial function in other ways. Thus, hyperlipidaemias, associated with an **absolute or relative excess of LDL *cholesterol*** are the most important, as they are associated with

atherosclerotic disorders (coronary artery disease, peripheral vascular disease, ischaemic strokes). This type of hyperlipi-daemia is most satisfactorily treated with **statins (and resins)**. Statins are **inhibitors of HMG-CoA** (3-Hydroxy-3-Methlylglutaryl Coenzyme A) **reductase**, a ubiquitous cellular enzyme whose antagonism interferes with LDL formation but enhances HDL synthesis; LDL levels may be reduced by up to 40%. The bile-acid binding resins are non-absorbable ion exchange resins, interfering with lipid products entering in the enterohepatic circulation; LDL levels may be reduced by up to 30%. The latter drugs are poorly tolerated and except in combined hyperlipidaemias (see below), they have been superseded by the statins.

Excessive *triglyceride* concentrations (mainly chylomicrons or VLDL) appear to confer some risk of coronary heart disease, particularly in the presence of low concentrations of HDL. When triglyceride concentrations are markedly increased, they predispose to acute pancreatitis. **Fibrates** enhance triglyceride catabolism (besides having other actions), and appear to be the best form of drug treatment. When **both components (LDL & *triglycerides*) are in excess** and combined treatment is needed, **fibrate + resin** are given; statin/fibrate combinations confer a higher risk of myositis/myopathy than either drug alone.

Adverse/Side Effects, Drug Interactions & Other Concerns

For statins, resins and fibrates, the most commonly encountered side/adverse effects and drug interactions are summarised in **table 4**. It has also been suggested that lowering lipid levels in plasma (or perhaps the lipid lowering drugs themselves), somehow increase the overall risk of death due to other causes, particularly violence and cancers. Although these assertions have been the cause of much controversy, they remain unsubstantiated and currently they are by and large discounted. The cost effectiveness of lipid lowering drug therapy (including corresponding screening programmes) is another cause for debate, especially when advocated for patients at relatively low risk (young persons with no cardiovascular risk factors). Lastly, in considering the likely cardiovascular benefits of appropriate screening and treatment, the possible generation of anxiety states and their impact on quality of life should not be ignored.

Guidelines for Lipid Lowering Therapy

Indications for Treatment are outlined below (**table 1**). and should be applied conservatively in premenopausal women and those aged > 70 years. Normally, drug treatment (**table 2**) is resorted to only after dietary modification fails (based on 2 sets of serum lipid measurements at least three months apart).

Table 1: Indications for Treatment

1. Known coronary artery disease	+	**serum cholesterol ≥ 5.2 mM** and/or **serum HDL ≤ 1.0 mM**
2. Any of the following Peripheral vascular disease IHD in first degree relative < 60 yrs Familial hypercholesterolaemia Hypertension Diabetes mellitus Ischaemic stroke	+	**serum cholesterol ≥ 6.2 mM** or **serum cholesterol ≥ 5.2 mM** **but serum HDL ≤ 1.0 mM**
3. Patients with none of the above but severe hyperlipidaemia	+	**serum cholesterol ≥ 7.5 mM** **or triglycerides ≥ 10 mM**

Table 2: Selection of Antihyperlipidaemic Drug Therapy *

High cholesterol:	———	**Statin**	(e.g. fluvastatin 10 mg nocte)
	if needed add	**Resin**	(e.g. cholestyramine 4-8 G/day)
High triglycerides:	———	**Fibrate**	(e.g. gemfibrozil 600-1200 mg/day)
Combined hyperlipidaemia:	triglycerides +	(1 - 3 mM) - **Statin**	
	triglycerides ++	(> 3 mM) - **Fibrate,** add **Resin** if needed	

Target LDL ≤ 2.6 mM for patients with existing coronary disease. **Start with low doses**, monitor CK, AST and ALT especially in first 6 months. ***Caution:** high myositis risk with statin/fibrate combinations?

Background information

Depending on which lipids are present in excess, they appear to predispose individuals to life threatening a) atherosclerosis, and more rarely b) acute pancreatitis. Thus, hyperlipidaemias, also known as *hyperlipoproteinemias*, are associated with several commonly encountered diseases (coronary artery disease, peripheral vascular disease, hypertension, diabetes mellitus & ischaemic stroke) and occasionally with recognised hereditary disorders of lipid metabolism. Current consensus based on clinical trials with lipid lowering drugs, suggests that they confer a clear benefit in the context of secondary prevention (i.e. after atherosclerosis is manifest).

Measurement of serum/plasma lipoproteins: Total cholesterol, triglycerides, HDL (high density lipoprotein) & calculated LDL (low density lipoprotein) cholesterol - should be determined on blood samples from fasting patients in their normal environment.

These Guidelines have been adapted from ***Guidelines for Lipid Lowering Therapy*** issued by the Working Group on Rational Prescribing of Drugs at Queen Mary Hospital in 1995. The costs of corresponding drug therapy are outlined in **table 3**.

Table 3: Comparative Costs of Lipid Lowering Drugs in HA Hospitals (January 1996)

STATINS	**Average LDL cholesterol lowering effect**	
	25 - 30%	**35 - 40%**
	Daily dosage (Cost)	**Daily dosage (Cost)**
Simvastatin	10 mg nocte ($7.50)	20 - 40 mg nocte ($15 - 30)
Simvastatin + cholestyramine		10 - 20 mg nocte + 4 g ($9.88 - 17.38)
Lovastatin	20 mg " ($7.50)	40 - 80 mg nocte ($15 - 30)
Pravastatin	20 mg " ($9.08)	-
Fluvastatin	20 - 40 mg " ($4.64 - $6.61)	-
OTHER DRUGS	**Typical Unit Dose**	**(Cost)**
Cholestyramine	4 g	($2.38)
Bezafibrate	400 mg SR	($3.10)
Fenofibrate	300 mg	($3.00)
Gemfibrozil	300 mg 600 mg 900 mg SR	($0.92) ($1.89) ($3.50)

SR = sustained release
Bezafibrate 400 mg SR ≡ fenofibrate 300 mg ≡ gemfibrozil 600 mg BD (900 mg SR)

Table 4: Problems with Lipid Lowering Drugs

	Adverse/Side effects	Drug Interactions
Statins	1) CK increase * (often transient), **myositis, myopathy**, rhabdomyolysis 2) AST & ALT increases # 3) Mild GI upset, headache, rash 4) Hepatic tumours in rodents **Long term & pregnancy safety ?**	**Increased toxicity** - metabolism inhibited by: *cimetidine, fibrates, omeprazole, cyclosporin, erythromycin* **Reduced efficacy** - metabolism induced by: *rifampicin*
Resins	**Tolerance poor** - constipitaion, dyspepsia	**Interfere with drug absorption:** *digoxin, thyroxine, warfarin, fibrates, thiazides, oral hypoglycaemics*
Fibrates	GI upset, CK increase * & reversible **myositis/myopathy,** rash, impotence	**Potentiate**: *warfarin*

N.B. Ceasing drug treatment recommended if : * > 10 fold, or # > 3 fold

Further Reading:

Farmer JA, Gotto AM 1994; Antihyperlipidaemic Agents. Drug Safety 11 301-9
Dalen JE , Dalton WS 1996; Does lowering cholesterol cause cancer? JAMA 275 67-9
The Medical Letter 1994; Fluvastatin for lowering cholesterol. 36 45-6

LIPID LOWERING TRIALS

Tin-Chu Law

Substantial evidence from epidemiological and animal studies has accumulated directly linking raised serum cholesterol concentrations with heightened risk for coronary heart disease. Therefore, since the mid 1960s, almost 50 clinical trials of cholesterol lowering to prevent coronary heart disease have been reported testing the hypothesis that cholesterol reduction can prevent coronary heart disease. The trials varied in type of intervention (diet, a variety of drugs, surgery), degree of cholesterol lowering achieved, duration of treatment, size and type of study population. Despite their heterogeneity, the trials have fairly consistently shown a reduction in coronary heart disease events (fatal plus non-fatal coronary heart disease events). For example, the results of the Lipid Research Clinic Coronary Primary Prevention Trial indicate that a 1% reduction in an individual's total serum cholesterol level translates into an approximate 2% reduction in coronary heart disease risk.

However, there is continuing debate about the overall benefit of cholesterol lowering. Up to 1993, although almost all trials showed a favourable trend for coronary heart disease mortality, only 2 (secondary prevention) trials reported a significant reduction. Conversely, non-significant trends toward increases in non-coronary heart disease mortality were observed in 3 large-scale trials (Lipid Research Clinic - Coronary Primary Prevention Trial, WHO - clofibrate trial, and Helsinki Heart Study). Most treatments had no discernible effect on total mortality, exception being significant increase in WHO-clofibrate trial and a significant decrease in one secondary prevention trial.

Why Can't Individual Trials Prove Beyond Doubt the Beneficial Effect of Cholesterol Lowering on Survival ?

The most likely reason for these trials not showing a reduction in total mortality is they were not statistically powered to do so when deaths unrelated to coronary heart disease were included. That is, the difference in coronary heart disease mortality were not large enough to produce statistically significant differences in total mortality in the study populations with many other competing pathways of mortality risk.

If the goal of a trial was to achieve a significant difference in overall mortality, the available data suggest that the chances of success would be optimised by the following : selecting a very large population sample at high risk for coronary heart disease but at low risk for non-coronary heart disease events; use of as effective a lipid-lowering regimen as possible and for as long a period as possible. Before the large-scale, long-term statin trials era, all the studies could only achieve a modest reduction in cholesterol concentration (0.4 - 1.1 mmol/L). Only 3 trials had a total patient number exceeding 4000 (Helsinki Heart study, WHO - clofibrate trial and EXCEL study).

Is There Any Possible Adverse Effect of Cholesterol Lowering ?

The data that raise concern have come from 2 sources. Firstly, a meta-analysis of selected primary prevention trials by Muldon et al demonstrated an excess mortality from cancer and non-cardiovascular, non-cancer causes which essentially consisted of deaths from suicides, accidents, and homicides. This balanced the reductions in the number of deaths from coronary heart disease so that all-cause mortality was unaffected. Secondly, population data demonstrated regularly that very low cholesterol levels, lower than those achieved in any of the primary intervention studies, were associated with a variety of non-cardiovascular diseases. As a result, it has been argued by a number of observers that cholesterol lowering itself may be unsafe.

The 3 primary prevention trials (Helsinki Heart study, WHO-clofibrate trial, Lipid Research Clinic - Coronary Primary Prevention Trial) fueled the majority of the excess non-coronary heart disease mortalities.

A closer look at the data from the Helsinki Heart study and the Lipid Research Clinic trial (Table 1)showed no demonstrable dose-response relationship between cholesterol lowering and traumatic death. Of the eight suicides in the group assigned to take drugs, only 3 individuals were actually taking the medication, and of the ten accidental deaths, six individuals were either taking no drugs or were taking less than half of the prescribed dose. Concerning the risk of developing cancer, the numbers in the WHO-Clofibrate trial is not statistically significant. Also there was no significant site specific excess nor is there any dose-response relationship. The duration of thetrial was shorter than the interva normally required for a carcinogen to exert its effect.

If we turn to the data from prospective population studies, the cohorts of employed men showed no excess mortality from cancer. On the other hand, the community cohorts showed an excess in the subgroup with the lowest cholesterol concentration (odds ratio 1.23, $p<0.001$). The difference between the employed and community cohorts was highly significant ($p<0.001$). This suggests that confounding is very likely.

Recent Lipid-lowering Trials Using Statins

The problems associated with the previous lipid-lowering trials are now mostly resolved after results of some better designed large scale trials using statins are published. The combination of excellent patient tolerance, low side-effect profiles and pronounced efficacy in reducing total and low density lipoprotein cholesterol have made the statin group of drug popular options for the primary and secondary prevention trials of coronary artery disease due to hypercholesterolemia.

1. West of Scotland Coronary Prevention Study

In this study, 40 mg per day of pravastatin or placebo was given to 6595 men with low-density lipoprotein (LDL) cholesterol levels in the range of 155 to 232 mg/dL (4.0 to 6.0 mmol/L). These patients had no definite history of myocardial infarction. Pravastatin lowered LDL cholesterol levels by 26% and increased levels of high-density lipoprotein (HDL) cholesterol by 5%, cutting rates of coronary events significantly - by one-third - during

the five-year follow-up. The 33% relative reduction in deaths from coronary heart disease therefore resulted in a 22% reduction in overall mortality, which was just short of statistical significance (p=0.051). There was no increase in deaths from non-cardio-vascular causes among the treated subjects.

2. Scandinavian Simvastatin Survival Study (4S)

In this secondary prevention trial, 4,444 ischemic heart disease patients in 94 centers throughout 4 Scandinavian countries were randomized to receive simvastatin or placebo. Over the 5.4 years median follow-up period, in the simvastatin group the total mortality was reduced by 30% (8% vs 12%, relative risk 0.70, 95% CI 0.58-0.85, p = 0.0003). The relative risk of coronary death was 0.58 (95% CI 0.46 - 0.73) with simvastatin. There was no statistically significant difference between the two groups in the number of deaths from non-cardiovascular causes and cerebrovascular deaths in the two groups. There is no significant difference in the total mortality for women in the 2 study groups. However, women on simvastatin had a higher probability of not having any major coronary event (85/1% vs 77.7%, relative risk was 0.65; 95% CI 0.47 - 0.90, p = 0.01). Although the observed relative risk reductions produced by simvastatin were somewhat less in the patients aged $\geq$ 60, they were statistically significant ($p < 0.01$ in both age groups for mortality and $p < 0.0001$ for major coronary events) and the absolute differences between treatment groups were similar in the two age groups.

Summary

There is now definite evidence that hypercholesterolemia is a main cause of coronary atherosclerosis and coronary heart disease. From clinical trials performed so far, it is clear that lowering serum cholesterol level can reduce incidence of coronary heart disease, coronary heart disease mortality and total mortality. The data is strongest for middle-aged men. For ischemic heart disease patients with age equal to or above 60, cholesterol lowering produces similar benefit according to results of the 4S study. On the other hand, although cholesterol reduction can decrease the incidence of major coronary events in female ischemic heart disease patients, there is still a lack of evidence that it will lower total mortality.

(Table 1: Helsinki Heart Study, WHO-clofibrate trial, Lipid Research Clinic - Coronary Primary Prevention Trials)

			No. of Deaths during Trials (Treated/Control)				
	No. of Subjects		**Ischemic**	**Other CV**		**Accidents**	**Other**
Trial	**Treated**	**Control**	**Heart D.**	**Diseases**	**Cancer**	**& Suicide**	**Diseases**
Helsinki	2051	2030	14/19	8/4	11/11	**9/5**	2/4
WHO	5331	5296	76/69	22/18	**72/54**	24/24	**21/6**
LRC	1906	1990	32/44	5/3	16/11	**11/4**	4/5

WHO Trial (after 5.3 years)		
Other diseases	21 vs 6	p = 0.006
Cancer deaths	72 vs 54	p = 0.12

Non-cardiac Deaths	
LRC-CPPT	33% ↑
Helsinki Heart study	34% ↑

Symposium 4

Exercise and Heart

EXERCISE AND CARDIOVASCULAR DISEASE: EPIDEMIOLOGY AND RISKS

Victor Froelicher

I. *General outline*

A Supporting data for the exercise hypothesis
B. Epidemiological studies in normals, including meta-analysis
C. Data supporting cause rather than just association Interventional studies in patients with disease
D Hazards of exercise
E. Sudden death during exercise
F. Athletics and sudden death
G. Conclusions

II. Effects of regular dynamic exercise on normal hearts

A. Morphologic changes

1. Larger hearts (cross-sectional and longitudinal)
   a) Echo examinations show an average increase in left ventricular (LV) mass of 47% in top athletes and 23% in athletic students compared to controls (Bjornstad; Cardiology 1993; 82:66-74)
2. Coronary artery size (parallels mass)

B. Hemodynamic changes

1. Lower heart rate, systolic BP
2. Greater cardiac output, VO_2, exercise capacity, coronary reserve
3. Better cardiac function
4. Faster recovery

III. Effects of regular dynamic exercise on the periphery

A. Vascular
B. Endocrine
C. Rheologic
D. Hematologic
E. Metabolic
F. Others

IV. Epidemiology

- the study of the distribution of diseases and associated factors in populations; there are three major types of epidemiological studies:

1 - Retrospective

Bus drivers
Harvard alumni
SF Longshoremen

2 - Prevalence

Cross-sectional

Bias problem: the sick population is generally more inactive

3 - Longitudinal (Prospective)

Observational vs. Interventional

A. *Major problem*: accurate assessment of physical activity

Meta-analysis can be helpful:

Powell, 1987: 43 studies included

Berlin, 1990: 28 studies included

B. AHA, ACSM, CDC Health Recommendation is ***activity*** rather than ***fitness*** prescription. *Activity is distinctly different from fitness training aimed at performance.*

V. Determining a causal relationship from epidemiological associations

A. Strength and primacy of the relationship
B. Temporal sequence
C. Graded response/predictive capacity
D. Independence
E. Reproducibility
F. Consistency

A. Strength and Primacy

Relative risk of CHD associated with inactivity ranges from 1.5 to 2.4 (Powell et al., Ann Rev Public Health, 1987; 8:253-87)

- note: more prominent risk factors such as hypertension, cholesterol, and smoking have only slightly higher relative risks

According to a more recent meta-analysis of 28 different studies on this relationship, "methodologically stronger studies tend to show a larger benefit of physical activity than less well-designed studies." (Berlin; Am J Epidemiol, Oct. 1990; 132(4):612-28)

B. Temporal sequence

- Must determine a sequence of events that supports a "cause/effect" relationship between the risk factor and CHD
- Approximately 67% of the 43 studies used in Powell's meta-analysis demonstrated that the activity level was established before the onset of CHD

C. Graded response/predictive capacity

- Most of the studies (analyzed by Powell) that used regression analysis or more than two levels of physical activity demonstrated increasing risk with decreasing activity
- A 16 year follow-up study on 1960 healthy Norwegian men (ages 40 to 59) found that "physical fitness appears to be a graded, independent, long-term predictor of mortality from cardiovascular causes in healthy, middle-aged men." (Sandvik, NEJM 1993; 328:533-7)

D. Independence

- Paffenbarger's numerous studies are strong support for physical activity's independence
- Recent study in the New England Journal of Medicine

Men, 42-60 years of age, without cancer or CAD: "Higher levels of both

leisure-time physical activity and cardiorespiratory fitness had a strong, graded, inverse association with the risk of acute myocardial infarction, supporting the idea that lower levels of physical activity and fitness are independent risk factors..." (Lakka, June 2, 1994: 330(22))

Other supporting studies:

- Lipid Research Clinics, 1988
- Multiple Risk Factor Intervention Trial, 1987
- Finland study of men and women, Salonen, 1988

E. Reproducibility

- Most of those studies analyzed by Powell reported a statistically significant association, a graded-response, or both--repeated observation of an inverse association
- note: similar results were found in different cultural/demographic regions
- Reproducible results have been demonstrated by studies in Berlin's meta-analysis as well

F. Consistency

Animal models demonstrate that physical activity induces changes on both the heart and the periphery

- Wild vs. domestic animals
- Increased fibrillatory threshold in dogs
- Increased coronary flow in pigs
- Smaller infarcts in rats

(Laughlin; J Appl Physiol 1992; 73:2209-25)
(Scheuer; Circulation 1982; 66:491-5)
(Kramsch; NEJM 1981; 305:1483-9)

Consistent Effects of chronic exercise on animals

- Age-dependent myocardial hypertrophy
  Myocardial histological changes
- Proportional increase in coronary artery size
- Coronary collateral circulation
- Improved cardiac mechanical and metabolic performance
- Favorable changes in skeletal muscle mitochondria and respiratory enzymes
- Myocardial mitochondria and enzyme changes
- Atherosclerosis delay and regression
- Serum cholesterol reduction

Epidemiological conclusions

Powell et al. in 1987 and Blair in 1992 both concluded that not only is physical activity inversely related to the incidence of CHD, but that low levels of physical activity are causal to CHD

Exercise intervention for Patients: Cardiac Rehabilitation

- Approach to MI has expanded to other patients
  Angina, CHF (damaged, dilated LV), HBP, post interventions
- Anecdotal and uncontrolled reports have suggested both benefits and harm from physical activity
- These results must be reproducible in order to become scientific fact

Exercise interventional studies

- PERFEXT
  - Only randomized trial looking for cardiac changes
  - Minimal changes were observed
- Post-MI meta-analysis
  - Improved survival of training group in randomized trials (mortality decreased by 25%)
- Recent studies using lipid-lowering therapy and exercise suggest slowing and/or regression of atherosclerosis

Peripheral adaptations are more important than cardiac changes in older patients

Epidemiology studies from the New England Journal of Medicine (Dec 2, 1993)

- One study of 1228 post-MI patients found that increasing levels of habitual physical activity were associated with progressively lower relative risks (Mittleman; 329(23):1677-83)
- Another study of 1194 acute MI patients found that a period of strenuous activity is associated with a temporary increase in the risk of having a myocardial infarction, particularly among patients who exercise infrequently (Willich: 329(23):1684-90)

Hazards of exercise

- Gynecologic--delayed menarche, secondary amenorrhea, oligomenorrhea
- Endocrinologic--hypoglycemic (for diabetics)
- Musculoskeletal--acute muscle injury, exertional rhabdomyolysis, strains and sprains, arthropathies, fractures
- Renal--hematuria, proteinuria
- Hematologic--anemia, GI blood loss
- Thermal--heat cramps, heat exhaustion, heatstroke, frostbite, hypothermia

Exercise and the diseased heart

Coronary artery disease = ischemia

- Due to atherosclerosis, congenital anomalies
- Temporary - angina pain
- Permanent - MI and possible death
- problem: exercise increases myocardial oxygen requirements

Heart muscle disease

- LV cardiomyopathy
- Hypertrophic [non-obstructive (generalized or localized) and obstructive (localized to septum)]
- Dilated due to damage (viral, CAD, alcohol)
- RV dysplasia
- problem: multifactorial or a mystery??

Valvular disease = insufficiency/obstruction

- problem: exercise requires an increase in cardiac output

Conduction system abnormalities

- problem: electrical system fails

Arrhythmias

- problem: tend to be secondary factors rather than independent

Risks of exercise

Sudden death

Exercise-related incidence per year:

- 1 out of 250,000 children and young adults
- 1 out of 50,000 adults in the general population
- 1 out of 200,000 high school and college athletes
- 1 out of 80,000 to 160,000 man-hours in populations with CAD

Patients with heart disease are at increased risk
Regular exercise decreases risk
(Siscovick, 1984 and Mittleman, NEJM 1993)

Sudden death

> 40 years of age

- Primarily due to CAD

< 40 years of age

- Most common causes: hypertrophic cardiomyopathy (approximately 50%), Marfan's syndrome, coronary artery anomalies

Prevalence of HCM in young people is approximately 0.1%

Less common causes: viral myocarditis, RV dysplasia, mitral valve prolapse, aortic valve stenosis,...

note: SCD is extremely rare in athletes; for young athletes it is usually due to congenital abnormalities

Sudden death in famous athletes

- Jim Fixx: Due to CAD
- Reggie Lewis: Nonspecific cardiomyopathy
- Hank Gathers: Dilated cardiomyopathy
- Pete Maravich: Congenital anomaly
- Flo Hyman: Dissecting aortic aneurysm (Marfan's Syndrome)
- Maryland basketball team inspired NIH research of SCD in athletes, however, registry is very difficult

Conclusions Regarding the Effects of Regular Dynamic Exercise

Regular Exercise results in Age-dependent increases in:

- LV mass
- LV size
- LV capillary density
- Collateral flow
- Coronary reserve
- note: these changes are inversely related to age

Direct effects on atherosclerosis are uncertain

Heart becomes more able to withstand stress

Physical activity decreases risk of CAD

Physical training results in advantageous hemodynamic changes

Risk of exercise-related death is low for asymptomatic people; screening is difficult and problematic (false positives)

Cardiac rehabilitation is mult-factorial, and the addition of an exercise component decreases mortality following myocardial infarction

REHABILITATION AFTER CARDIAC SURGERY

Simon Chow

Grantham Hospital remains as the major cardiac centre where open heart surgery is being performed. From October 1994 to November 1995, 217 patients who have ishcaemic heart disease had coronary artery bypass grafty (CABG) and 228 patients had valvular replacement out of a total of 796 patients undergoing open heart surgery. All had gone through Phase 1 in-patient programme and 59 had completed Phase 2 and proceeded with Phase 3 of the rehabilitation programme. More than 40% of the patients are over the age of 65 and this reflects the demographic changes as we have an aging population in our locality and the trend for CABG is changing in a similar fashion as seen in other Western countries. Operation on these elderly people carries with it increased morbidity and mortality [1,2] but then they can benefit equally well from cardiac rehabilitation programme [3] . A predominance of attendance by men over 65 after CABG and men under 65 after VR was noted. Prevalence of ischaemic heart disease in the male gender still holds true. Men are more actively engaged in the programme, eager to return to their role in the society and as bread-winner of their families, restoration of function and confidence is also quicker. This is in accord with similar study showing less well performance by the female counterparts [4,5] . Women, on the other hand, are more reluctant to participate probably due to their female role in our society, they being the carers of the families and where domestic affairs come first and their quest for 'complete recovery' seems less important to them.

AGE	CABG		VR	
	Male	Female	Male	Female
<65	6	0	13	5
>65	15	3	3	2

Almost 400 coronary interventions are performed each year and because of the better preserved left ventricular function, a higher proportion (about 50%) of patients with one vessel or two vessel disease, revascularisation is rapid and their stratified risk will be lowered. With the avoidance of major surgery and a shortened hospital stay (average 4 days compared dto 14 days for CABG) and a significant porportion of them are relatively young patients, return to work is rapid and education and relaxation technique and risk factors modifications become a more important issue for this group. Although in some instances revascularisation may not be complete and yet many a times they are adequate for symptomatic relief and improving prognosis [6]

In the last three years, four heart transplant, one lung transplant and recently the first heart-lung transplant have been performed in Grantham Hospital, this group will make up a specific group of patients for rehabilitation. Transmyocardial revascularsiation using carbon dioxide laser is a new modality to treat patients with refractory angina due to coronary artery disease and who have unfavourable anatomy for CABG or PTCA, becuase there is no immediate revascularisation and the long term result is still under study, rehabilitation for this group has to be modified.

Functional Outcome In Patients Undergoing Cardiac Rehabilitation After Cardiac Surgery

59 patients completed Phase 2 of our cardiac rehabilitation programme from October 1994 to November 1995, 24 (21 men and 3 women) had coronary artery bypass grafting (CABG) and 23 (16 men and 7 women) received valvular replacement surgery (VR). All patients enrolled would undergo Treadmill exercise tesitng (Bruce) 6 to 8 weeks fter discharge as a baseline and also 8 weeks after completion of the porgramme. Educational programme on heart disease and relaxation technique were conducted alongside with the exercise training. Patients' medications were adjusted according to completeness of revascularisation (CABG), left ventricular fucnction, presence of congestive heart failure postoperatively, and other concomitant medical conditions such as disabetes mellitus, hypertension and hypercholesterolaemia.

Outcome

1. Improved exercise capacity from 10.085 +/- 2.58 METS to 12.77 +/- 2.5 METS ($p< 0.0001$).
2. Peak presuure-rate product did not change significantly after exercise, 25.35+/-5.3 vs 24.98+/- 5.7 beats-mmHg/min X 10-3 (P=0.28).
3. Reduction of cholesterol from 4.34 +/- 2.15 to 2.795 +/-2.3 mmol/l ($p<0.0003$), CABG group from 4.83+/-0.5 to 3.77+/-0.41 mmol/l ($p<0.055$).
4. No change in body mass index (BMI), 22.69+/- 2.92 vs 22.37+/-3.17 kg/m2, CABG group from 23.46+/-2.49 to 22.6+/-2.52 kg/m2 (p=0.01).
5. Quality of life questionnaires from 55% of participants -
   - boosted self-confidence in coping with ADL's (46.2 vs 83.8%)
   - alleviation of anxiety (14.3 vs 71.4%)

Conclusions

1. Exercise capacity was significantly improved after completion of a 8 weeks' rehabilitaion programme.
2. Peak pressure-rate poroduct showed a slight reduction and this is in keeping with a favourable effect on myocardial oxygen consumption after exercise, although better classification of exercise capacity into low (3-5METS) moderate (5to 7 METS) and high (7 to 9METS) could further delineate the beneift obtained in each group. It is expected that the low exercise capacity group may benefit the most from exercise [7,8].
3. Reduction in cholesterol level was obtained by a combination of education, peer group effect, enhanced motivation and adjunctive use of lipid lowering agents. Cholesterol level within the CABG group may reflect vigorous control of lipid before surgery.

4. The slight reduction of BMI amongst the CABG patients reflects risk factors modification with education and patients' motivation, afterall morbid obesity is not a common entity amongst them. An expected increase in BMI in the VR group is not seen, this may be due to advanced heart failure preoperatively and the short time span of reassessment postoperatively.

5. The psychological aspect of rehabilitation is proven.

6. The long term evaluation of future cardiac events and readmissions is important as this may have significant public health implications.

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Phase I Programme

Hospitalized patients for:	Average length of stay (days)
CABG	10 -14
Valvular replacementsurgery	14 - 21
CHF	7 - 21
PTCA/Valvuloplasty	3

Aims

Remove fear and restore confidence of patients and family

Psychological boost to develop healthy attitude to life

Exercise to maintain a level of fitness which is adequate to the demands of patients' life

Allay the fear and anxiety toward the operation or medical intervention required (pamphlets, talks, pre-op ICU/CCU round)

Reduce the post-op complication and promote early recovery

Reduce the actual and potential risk factors

Obtain up-dated information on the effectiveness of medication (eg. warfarin)

Programme

Relatively short duration of stay, programme consists mainly of pre-op education, post-op physiotherapy and minimal physical activity

Health Talks conducted by doctors, nurses, physiotherapists, dietitian and MSW

Physiotherapy In ICU And CCU

Breathing and cough exercise
Ankle and toe exercise
Fingers movement
Slight alternate knee flexion/ extension

Exercise

warm-up
5 times progressively increase to 10 times
cooling down
frequency - 2 to 3 times daily, 5 to 10 minutes, increasing to 5 to 20 minutes of aerobic exercise
perceived exercise scale

Phase 2 Programme

Early post discharge exercise programme together with substantial life style modifications

Patients Selection Criteria

All patients admitted for cardiac surgery, coronary interventions, heart failure and post MI, patients from SOPD, private and self referrals

Absence of disease limiting rehabilitation - cancer, stroke , symptomatic peripheral vascular disease, disabling rheumatological or musculoskeletal deformations

Cardiac stability - exclude uncontrolled heart failure or arrhythmias, uncontrolled hypertension. Patients with advanced LV dysfunction or cardiac cachexia may require prolonged hospitalization, modified exercise programme

Adequate motivation, family/spouse support.

Adequate compliance and transport facilities.

Objectives

Provide understanding for both patient and family members regarding cardiovascular disease and to continue appropriate steps for risk factors modifications

Prevent the deleterious effect of deconditioning and to restore an exercise capacity that is appropriate to their clinical status, lifestyle and occupation

Adopt a proper exercise technique and progress in a safety manner

Adapt a transitional period before a return to home environment through the continuous exercise training and education offered during Phase 2

Meet with the psychological needs of patients and families, restore confidence and reduce anxiety and depression due to illness

Obtain up-date information on the effectiveness of medication in coping with the cardiovascular symptoms and the recovery process

Assist in the gradual resumption of patient's previous occupational and vocational activities

Improve the individual's quality of life

Successful Criteria

Patients and family members are able to increase their understanding on heart diseases and the related concerns

Activity level and functional capacity are explicitly increased

Appropriate blood pressure, heart rate, body lipid and body weight

Cessation of smoking

Increased understanding in stress and stress cycle and give appropriate response to cope with stress and improved psychological profile

Return to work

Reduction of readmission rates for congestive heart failure, coronary events and mortality

Improvement of exercise capacity in terms of 10% reduction of rate-pressure product and increased work performance (METS)

Educational Programme

(pamphlets, viedos, talks)

Exercise Programme

Subjective and objective assessment performed

Symptom limited maximal stress test

- target METs (60 - 85 %)
- target HR (max HR - rest HR) (65 - 90%) + rest HR

Development of cardiorespiratory endurance (PES) with physiological benefits shown 4 to 6 months after exercise
Modified modes of exercise requiring less supervision

Home exercise, relaxation technique

Noncardiological Complications Of CABG

Unstable sternum, wound infection
Chest wall pain
Respiratory problems- deconditioning
atelectasis
pleural effusion
phrenic nerve palsy
Swollen leg and wound infection
Neurological problems
- major, stroke
- minor, brachial plexopathy, peripheral neuropathy
Renal failure - peritoneal dialysis

Cardiac Tranplant

Conservative exercise prescription
Denervated heart
- chronotropic response to exercise delayed and blunted prolong warm-up and cool- down sections supersensitivity to catecholamines (increase resting HR)

Rehabilitation hindered by rejection episodes (complex arrhythmias -ECG monitor)
Infections - contacts, equipments
Immunosuppression
- muscular atrophy and weakness hypertension from cyclosporin (BP monitor)

Accelerated graft atherosclerosis
- dyspnoea (anginal equivalent)

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PRE-PARTICIPATION EVALUATION OF THE ATHLETE

Victor F. Froelicher

I. Distinguishing hypertrophic cardiomyopathy from athletic heart syndrome

A. Characterizing HCM

1. Exam, family history, 12-lead ambulatory ECG, **echo** (most definitive measure
2. When maximum diastolic LV wall thickness is > 15mm, HCM is considered to be present
   a) 13-14mm = "gray zone"--possible risk should be resolved with other echo or clinical features
3. Septum/posterior free wall ratio usually > 1.3; average = 1.5

B.Screening in the future

1. Deconditioning leading to reduction in the septal thickness of athlete's heart may distinguish it from HCM (Maron, Br Heart J 1993; 69:125-28)
2. Echo indices of LV filling may also help distinguish these two similar syndromes (Lewis, Br Heart J 1992; 68:296-300)

II. ACC/ACSM Task Force guidelines on screening for sports participation

A. Hypertrophic cardiomyopathy

1. **Unequivocal diagnosis**
   a) Participation only in low intensity competitive sports (This includes those athletes with <u>and</u> without symptoms or LV outflow obstruction)

2. **Age > 30: individual judgment if the following are absent**
   a) Ventricular tachycardia
   b) Family history of SCD due to HCM
   c) History of syncope
   d) Severe hemodynamic abnormalities
   e) Exercise-induced hypotension
   f) Moderate-to-severe mitral regurgitation
   g) Evidence of abnormal myocardial perfusion

B. Mitral valve prolapse

1. Presence of <u>any</u> of the following criteria suggests participation in <u>only</u> low-intensity sports
   a) History of syncope (arrhythmogenic in origin)
   b) Family history of SCD associated with mitral valve prolapse
   c) Repetitive forms of sustained and non-sustained SVTs or complex ventricular arrhythmia's

d) Moderate-to-marked mitral regurgitation
e) Associated embolic event

C. Myocarditis

Athletes judged to probably have myocarditis should be withdrawn from all competitive sports with a subsequent convalescent period (6 months)

1. Return to competition should be allowed when ventricular function and cardiac dimensions are normalized, and clinically relevant arrhythmias are absent
2. There is no basis for strong recommendation of an endomyocardial biopsy as a pre-condition for return to competition

D. Pericarditis

1. No participation during the acute episode
2. Can return to competition when disease is no longer active

Screening for Sports Participation

- History of chest pain or syncope are the best signs
- Syncope during as opposed to post-exercise
- Vasodepressor syncope reproduced by positive head-up tilt testing has been reported in small series of healthy persons and athletes with syncope after exercise--syncope generally occurred in the recovery period of exercise, when venous return was diminished (Osswald, Annals of Internal Medicine 1994; 120(12):1008)
- Hypertrophic cardiomyopathy is very difficult to discern from "athlete's heart"
- Athletic Heart Syndrome includes many abnormalities that are not dangerous
- Gallop sounds, increased heart size/movements
- Wilt Chamberlain - multiple caths for inverted T waves

REHABILITATION IN HEART FAILURE

Cheuk-Kit Wong

Abstract

The role of exercise training in heart failure has received much attention from medical personnel involved in cardiac rehabilitation. The following points are extracted from a recent review article by McKelvie etal in JACC 25:789.

1. Exercise capacity is not related to the degree of left ventricular systolic dysfunction.

2. Abnormalities of skeletal muscle blood flow, metabolism and structure may partly explain the impaired performance.

3. Studies on the effect of exercise training in heart failure were generally of small scale. Some studies had shown improved exercise capacity and symptoms.

4. No data on harder endpoints like left ventricular function, mortality and morbidity or other aspects including hospital stay and quality of life.

On the contrary, **medical** management of congestive heart failure has undergone revolutionary changes in the last decade, which active personnel in cardiac rehabilitation should be aware of. The lecture will therefore reveal the development of various treatment strategies from a clinical and scientific perspective.

Workshop

The Pathology and Epidemiology of Coronary Artery Disease

ANATOMY AND PHYSIOLOGY

Chee-Wo Wu

1. Heart and Circulation

All parts of the body need blood so that they can function properly. The heart pumps the blood. The heart sits inside the chest between the lungs. It is the size of a fist.

All parts of the body receive blood from the heart through the arteries and the blood return to the heart through the veins.

The most important pumping chamber of the heart is a muscular bag called the left ventricle. It pumps blood into the biggest artery in the body which is called the aorta. Blood is disturbed to all the arteries of the body through the aorta except the lungs.

Blood then flows from the arteries to every small blood vessels of all the organs which are called capillaries. Nutrients and oxygen are delivered to the organs through the capillaries.

After blood leaves the capillaries, it goes to the veins. All the blood from the veins are collected into the right atrium except those from the lungs.

Blood from the right atrium then go into the right ventricle. The right ventricle then pumps blood into the lungs where oxygen goes into the blood. All the blood from the lungs collects in the left atrium which is then flow to the left ventricle to complete the cycle of circulation.

Blood valves have the function of allowing blood flow to occur in only one direction. There are 4 principal heart valves:

1. Mitral Valve is between the left atrium and the left ventricle.
2. Aortic Valve is between the left ventricle and the aorta
3. Tricuspid Valve is between the right atrium and the right ventricle.
4. Pulmonary Valve is between the right ventricle and the main pulmonary artery

2. Coronary Arteries

The heart is like a bag of muscles. It also requires arteries to supply the nutrients for it to work. These arteries are called coronary arteries which get its name because it looks like a crown around the heart.

There are mainly 3 coronary arteries that provide nutrients to heart. The left main coronary artery arise from the left side of the proximal part of ascending aorta

It is divided into the left anterior descending artery and the left circumflex artery. The left anterior descending artery supplies the anterior and apical part of the left heart. The circumflex artery supplies the lateral part of the left heart.

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RISK FACTORS FOR CORONARY ARTERY DISEASE

Wai-kwong Chan

A. Classical Risk Factors

1. Smoking
2. Hypertension
3. Dyslipidemias
4. Diabetes mellitus
5. Family history
6. Male sex
7. Age

B. Other Factors

8. Hyperinsulinemia and insulin resistance
9. Postmenopansal women not receiving estrogen replacement therapy
10. Alcohol consumption
11. Obesity
12. Physical activity
13. Hyperfibrinogenemia
14. Polycystic ovary syndromme (PCOS)
15. Antioxidant vitamin status
16. Homocystinuria.

1. Smoking

- in the Framingham study and the British Regional Heart Study, the rate of IHD insmokers is about 3 times that of non-smokers.
- most studies on survivors of acute myocardial infarction suggest that giving upsmoking leads to fairly rapid loss of IHD risk
- no close relationship between the number of cigarettes smoked and the risk of major IHD

2. Hypertension

- in the Framingham study, individuals with hypertension (BP > 160/95 mmHg) had a two-fold increase in the risk of IHD when compared with normotensive subjects (BP < 140/90 mmHg)

3. Dyslipidemias

- major atherogenic influence of serum total cholesterol is mediated by LDL-cholesterol (especially the oxidized LDL)
- importance of both elevated plasma cholesterol and decreased HDL-cholesterol (< 0.9 mmol/l) levels as risk factors for IHD (HDL-cholesterol 1 1.6 mmoV1 is regarded as anegative risk factor)
- a study of dyslipidemia in Hony Kong Chinese AMI patients in UCH showed that the most frequent lipid disorder was low HDL-cholesterol and the commonest combination disorder was low HDL-cholesterol and elevated LDL-cholesterol

- *4. Diabetes Mellitus*in countries where IHD is prevalent (eS· USA, UK), DM is associated with a two-fold increase in risk of major IHD event.
- DM aggravates the existence and development of atherosclerosis and IHD
- British Regional Heart Study strongly suggests that asymptomatic hyperglycemia is an independent risk factor for major IHD events.

5. Family History

- IHD is well recognised as clustering in families and a positive family history of IHD (i.e. definite myocardial infarction or sudden death before 55 years of age in father or other male first-degree relative or before 65 years of age in mother or other female first-degree relative) is accepted as a risk factor

6. Male Sex

- men of 35 - 44 years have a mortality rate from (IHD) 5-6 times higher than women ofthe same age
- difference diminishes with increasing age
- women are probably protected by their hormonal function during menstrual life

7. Age

mortality rate from IHD rises steeply with increasing age (about 15 - fold from 35 - 44 years to 55 - 64 years in men and about 30-fold in women over the same 2 decades) probably due to cumulative effects of hypercholesterolemia, hypertension, cigarette smoking and other factors over time.

8. Hyperinsulinemia and insulin resistance

risk factors for coronary heart disease, including lipoprotein abnormalities, hypertension and adiposity, may be metabolically interlinked with insulin resistance.

- insulin sensitivity correlated positively with HDL-cholesterol and negatively with HDL-cholestrol and negatively with triglycerides, android fat proportion and systolic BP
- central role of insulin resistance and hyperinsulinemia in the development of risk factors associated with CHD

9. Postmenopausal Eomen not Receiving Estrogen Replacement Therapy

- postmenopausal women are 2-3 times more likely to have a` heart attack than premenopausal women
- influence of estrogen therapy on lipoprotein metabolism. i.e. a decrease in LDL -cholesterol and an increase in HDL-cholesterol; progestins have the opposite effects.

10. Alcohol Consumption

- Compared with non-drinkers, women consuming a moderate amount of alcohol (1-20gm/day) had lower triglyceride, total cholesterol, insulin, body mass index and higher concentration of HDL-cholesterol.
- moderate alcohol consumption is associated with lower level of cardiovascular risk factors in women and insulin may have a central role.

11. Obesity

- overweight/obesity cannot be shown to have an independent effect on IHD risk
- probably operates through other risk factors eg. hypertension, hypercholesterolemia, decreased HDL-cholesterol, lack of physical activity.
-

- evidence that central obesity (waist:hip ratio) is an independent risk factor for IHD.

12. Physical Activity

- sustained regular physical activity is to some degree protective against IHD (modification ofrisk factors eg. T HDL-cholesterol, improves diabetic control)
- overall evidence suggests that a life-time of regular moderate activity is probably the best course.

13. Hyperfibrinogenemia

- Hyperfibrinogenemia is an independent risk factor for IHD
- one study of patients with AMI found a significantly greater incidence of thromboembolism in cases of increased serum fibrinogen level, suggesting a hypercoagulable tendency in this condition.

14. Polycystic Ovary Syndrome (PCOS)

- women with PCOS have risk factors, including anovulation, hyperandro-genism and insulin resistance which suggest a male coronary heart disease risk factor profile
- significantly increased cardiovascular disease risk factors compared with control women (increase in body mass index, insulin, triglyceride levels and decrease in total HDL-cholesterol and increased total cholesterol, fasting LDL levels, waist/hip ratio and systolic BP)

15. Antioxidant Vitamin Status

- in the Scottish Heart Health Study; combined dietary intake of the antioxidant vitamins C, E and carotene differentiate. CHD prevalence as well as do the classical risk factors (antioxidants help to prevent the formation of oxidized LDL)

16. Homocystinuria

- an autosomal recessive disorder which occurs in approximately 1 in 75,000 live births due to deficiency of cystathionine P-synthase
- prone to arterial and venous thrombosis, medial degeneration of aorta and large arteries, intimal hyperplasia and fibrosis
- predisposition to premature coronary artery disease and myocardial infarction

(References: available on request.)

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CARDIAC MEDICATION

Kai-Fat Tse

Cardiovascular system,comprised of heart and network of interconnecting blood vessels,provides oxygen, nutrients, and hormones to support life and also remove waste products of cellular activity to organ of excretion.

Cardiovascular drugs act on different components of the CVS by either

1. Directly toward ***cellular process*** of the muscle cells of the heart and the blood vessels.(e.g. membrane receptors, ion channels, ion transporters, enzymes) or
2. Indirectly interfering the ***neurohumoral homeostatic echanisms or local regulatory processes.***

They are classified according to

- Therapeutic function:
  Coronary arterial dilators, Venodilators, Sinus node inhibitors, Hypolipidemic agents, Diuretics, Antiarrhythmics, Thrombolytics, ***Antithrombotic agents***, Inotropics
- Actions on receptors/enzymatic reaction:
  Sympathomimetics, ***Beta-blocker***, Alpha-blocker, ***Calcium antagonists, ACEI***
- As an individual specific group:
  Digitalis

Action of Receptors:

Alpha 1: vascular and nonvascular ***smooth muscles contraction***
Alpha 2: vasoconstriction

Beta 1: ***increased contractility, cardioacceleration*** and enhanced AV nodal conduction

Beta 2: vasodilatation and decreased peripheral vascular resistance

Different agents any act as ***Agonists or Antagonists***

Catecholamines

Dopamine

- Stimulation of beta receptors at ***2-5 ug/kg/min IV***
- positive inotropic and chronotropic effects --> ***increase in cardiac output***
- PCWP may decreased slightly or remain unchanged
- ***Peripheral vasodilatation***, ***increased renal flow, urine volume***, and sodium excretion
- Activation of beta receptors `>5 ***ug/kg/min IV***
- *Peripheral vasoconstriction*

- *No further change in cardiac output* as arterial pressure increase
- PCWP, PA pressure, Pulmonary vascular resistance increase
- ***Treatment of hypotension***
- ***Augment urine output*** in patients with or without heart failure.
- *Increase in myocardial oxygen consumption and excessive vasoconstriction*
- *Induce arrhythmias*

Dobutamine

- Alpha and beta receptor agonist

- Net effects are ***increase in cardiac output, with little or no increase in heart rate.***
- Systemic and pulmonary vascular resistance decrease with modest decrease in PCWP
- *Effective in acute and chronic heart failure*
- Dobutamine is ***preferable in pump failure and low cardiac output when PCWP is elevated and BP is adequate***
- ***Excessive tachycardia and ventricular tachyarrhythmias are less common***
- *Increased myocardial oxygen consumption and possibility of worsening myocardial ischemia remain potential disadvantages*

Isoprenaline

- Stimulate beta 1 and beta 2 adrenoreceptor equally
- ***Increase myocardial contractility, heart rate and decrease systemic vascular resistance***
- *Significant hypotension and decreased myocardial perfusion*
- *Potent arrhythmogenic* agent
- ***Use in bradycardia or complete heart block*** before temporary pacing
- Maintain adequate heart rate and inotropic state of ***denervated transplanted heart***

Adrenaline

- Agonist at alpha 2, alpha 2, beta 1 adrenergic receptors
- ***Increase heart rate, myocardial contractility*** but *increased vascular resistance*
- *Increase oxygen consumption*
- May result in *decrease in cardiac output.*
- Principle use: ***resuscitation for cardiac arrest***

Nitrates

- ***Vasodilatation of veins, arteries, and arterioles.***
- Nitrates induce ***venodilation at very low dose*** resulting in pooling of blood in the venous or capacitance circulation
- With decrease return of blood to right side of heart, cardiac preload reduces and oxygen consumption reduce
- ***Decrease signs and symptoms of pulmonary congestion.***
- ***reflex tachycardia may limit or even prevent a decrease in cardiac output.***
- ***As doses increase, nitrates induce arterial and arteriolar vasodilatation***
- Coronary, splanchnic, renal beds and systemic vascular ***resistance decrease***
- ***Improves efficiency of left ventricular emptying in congestive heart failure.***
- ***Use*** for acute episode of ***angina*** particularly with impaired LV function or vasospasm
- Nitrates ***improve exercise duration to the onset of angina***
- First-line therapy in ***unstable angina***
- Nitrates administrated early during AMI may reduce infarct size and decrease complications of AMI

- Indication in AMI Patients with persistant hypertension or pump failure
- Nitrates ***decrease elevated left ventricular filling pressure of acute pulmonary edema***
- It is important to ***ensure the systolic arterial pressure and left ventricular filling pressure are adequate before using IV nitrates***
- *Headache and dizziness* preclude continuation of nitrate in about 20% of patients.
- *frequently attenuate or completely disappear after several days to 2 weeks*
- *Acute hypotensive reactions* may cause dizziness and even syncope.
  12 or more hours of sustained nitrate availability may induce a more complete
- form of *tolerance* than intermittent nitrate dosing regimens.
- ***Of great importance is the presence or absence of a nitrate-free interval each day.***

Digoxin

- ***Positive Intropic Effect***
- ***Constriction of isolated arterial and venous segments***
- ***Reduction of atrioventricular nodal conduction***
- Activation of parasympathetic nervous system at therapeutic concentration, stimulation of sympathetic system at toxic concentrations
- Vagal stimulation decrease beta-adrenergic-mediated cardiac catecholamine resulting in the potential to exert beneficial antiarrhythmia effects.
- usually ***improves left ventricular function in patients with chronic congestion heart failure***, appears to be more effective in patients with overt heart failure and significantly impaired left ventricular systolic function.
- *No significant increase in cardiac output in heart failure complicating AMI*
  Should be considered in conjunction with vasodilators or ACEI and diuretics
- Particular benefit in ***treatment of heart failure associated with atrial fibrillation***
- *Little value in isolated mitral stenosis with normal sinus rhythm*
- *Relative contraindication in hypertrophic cardiomyopathy..*
- Most common indication is ***atrial fibrillation with a rapid ventricular response***
- *Conversion of AF to sinus rhythm is not expected.*
- Digitalis is ***also effective in control of paroxysmal atrial or AV nodal tachycardia***
- ***Contraindicated for treatment of AF associated with WPW syndrome***
- *Almost all types of arrhythmias been reported with digitalis intoxication*

Beta-Adrenergic Blockers

- ***Selective beta-blockers*** have less of an inhibitory effect on the beta2-receptors that mediate dilation of arterioles and are thus ***less likely to impair peripheral blood flow.***
- Even ***selective beta-blocker may aggravate bronchospasm.*** These drugs are not generally recommended for patients with asthma or other bronchospastic disease.
- Certain beta-blockers have ***Partial Agonist Activity)***--slight to moderate activation of beta-receptor even they prevent the access of natural and synthetic catecholamines.

- Suggestion that ***drugs with PAA cause less slowing of the resting heart rate*** than other beta-blockers.
- ***Claim that PAA in a beta-blocker protects against myocardial depression, bronchial asthma, and peripheral vascular complications.***
  Additional alpha-adrenergic blocking action (e.g. labetalol) result in reduction of peripheral vascular resistance and maintain cardiac output.
  Use in hypertension, angina pectoris and arrhythmias
- Effective in sinus tachycardia, supraventriuclar ectopics, paroxysmal supraventricular tachycardia, atrial flutter, atrial fibrillation, ventricular tachycardia, prevention of ventricular fibrillation.
  Long-term treatment in survivors of AMI have demonstrated a favourable
- ***effect on total mortality, cardiovascular mortality, and incidence of nonfatal reinfarction.***
- ***Useful*** in controlling the dyspnoea, angina, and syncope in ***Hypertrophic Cardiomyopathy***
- It appears that beta-blockade can ***correct the excessive catecholamine stimulation of the heart that occur in chronic congestive heart failure and possibly improve left ventricular function*** (Carvedilol)
- During acute phase of ***dissecting aortic aneurysms***, beta-blocking agents reduce the force and velocity of myocardial contraction and hence progression of dissection
- Beta-adrenergic blockers can cause ***regression of left ventricular hypertrophy***
- *Side* effects include *myocardial failure, sinus node dysfunction and atrioventricular conduction delay, bronchoconstriction and peripheral vascular effects*

The various beta-blocking compounds given in adequate dosage appear to have comparable antihypertensive, antiarrhythmic, and antianginal effects.. The choice in an individual patient is determined by the pharmacodynamic and pharmacokinetic differences between the drugs, in conjunction with patient's other medical conditions.

Calcium Channel Blockers

- ***Role of calcium*** in mediating excitation-contracting ***coupling in cardiac muscle and in vascular smooth muscle*** is of greatest significance.
- ***A very heterogeneous group of compounds*** having ***varying potencies*** for blocking the ***myocardial slow channel*** and for inhibiting calcium fluxes in ***vascular smooth muscle cells***
- ***Classification of Calcium Antagonists***
  Type 1 "balanced" in vivo myocardial, electrophysiologic, and vascular effects
  Type 2 predominantly vascular effects in vivo
  Type 3 markedly selective vascular effects
  Type 4 Complex pharmacologic profiles
- ***Dilating actions*** in the resistance and capacitance ***vessels*** and in ***coronary sinus flow*** in the coronary circulation
- Role best established in ***ischemic myocardial syndromes, especially in Prinzmetal's angina, unstable angina, and chronic stable angina.***
- Role in control of ***certain supraventricular tachyarrhythmias***, but place in ventricular arrhythmias is less well defined.
- ***IV verapamil*** is well established for treatment of ***AV nodal re-entry tachycardia*** and predictably reduce the

ventricular rate in ***atrial flutter and fibrillation***.

- Oral and diltiazem are highly effective in reducing the ***ventricular response in atrial flutter and fibrillation at rest was well as during exercise..***
  Unlikely to be effective in preventing relapse of atrial flutter and fibrillation
- after chemical or electrical conversion of the arrhythmias
- *Contraindicated in atrial flutter and fibrillation complicating the WPW* because they aggravate the ventricular response and precipitate ventricular fibrillation.
- ***Do not proarrhythmic effects***.
- Control of mild to moderate ***essential hypertension*** and in the management of ***hypertensive emergencies***.
- Calcium channel blockers, alone or in combination with beta-blockers, appear to improve both systolic function and diastolic function in ***HCM.***
- ***Newer vasoselective calcium channel blockers*** function essentially as afterload-reducing agents with no negative inotropic action. They may be of ***potential value in patients with heart failure***, especially in the setting of coronary artery disease.
- They may also be of value as afterload-reducing agents in patients with ***aortic and mitral regurgitation.***
- *Side Effects* from *vasodilating* and *relatively negative inotropic and chronotropic properties*: myocardial depressant, bradycardia, headache flushing, ankle edema

Angiotension Converting Enzyme Inhibitors

- ACEI ***blocks the conversion the Ang I to Ang II*** in the serum as well as at local tissues.
- ***Decreases left ventricular mass*** in hypertensive patients with and without LVH.
- Increase arterial compliance
  Particularly effective in controlling arterial pressure in patients with
- ***renovascular hypertension and elevated plasma renin activity.***
- ***Little metabolic side effects*** and do not affect total cholesterol LDL, or HDL, triglyceride
- Treatment of ***heart failure***
- Chronic therapy for severe heart failure with careful dose adjustment can avoid excessive and precipitous reduction in blood pressure, optimize renal hemodynamic changes, and improve GFR.
- ACEI ***improves survival in heart failure***
  ACEI may ***prevent ventricular remodeling and dilation in patients with ventricular dysfunction without overt CHF especially after myocardial infarction..***
- Possible role in treatment of atherosclerosis, cardiac hypertrophy, and diabetic nephropathy
- Adverse effects include *hypotension, impaired renal function and cough (5-7%)*

Plantlet Inhibitors

Aspirin

- Inhibit cyclo-oxygenase in platelets thus inhibiting the formation of thromboxane A2.
- ***Prevention of myocardial infarction***
- *Mainly gastrointestinal side effects* which are dose related.
- Rarely significant generalized bleeding.

Ticlopidine

- An inhibitor of adenosine diphosphate pathway of platelet aggregation.
- ***Inhibit most of the known stimuli to platelet aggregation***
- Reduces incidence of acute occlusion and thrombosis after ***coronary angioplasty***
- Effective in reducing vein graft closure after ***CABG***

Heparin

- Heparin is not a single structure but a ***family of mucopolysaccharide chains of varying length and composition.***
- Essentially direct and immediate anticoagulant effect by ***accelerating the action of naturally occurring plasma inhibitor antithrombin III.***
  Low-molecular-weight heparin (molecular weight 5000 to 7000 daltons) effectively catalyses the inactivation of factor Xa by antithrombin III, yet ***less antithrombin effect and less interaction with platelets*** as high molecular weight heparin.
- ***Heparin's half-life is variable and dose requirement are not identical for all patients.***
- Dosage monitoring by APTT
- ***Protamine sulphate*** neutralize heparin.

Oral Anticoagulants

- ***Coumarin anticoagulants prevent recycling of vitamin K*** necessary for post-translational modification of factors II, VII, IX, Protein C and Protein S.
- ***Numerous medications interact with warfarin.***
- The dosage is monitored by prothrombin time, INR (international normalized ratio)
- Action reverted by ***fresh frozen plasma*** or ***Vitamin K1***

CORNARY ARTERY DISEASE AND DIABETES

Wai Cheong Yip

Diabetes Mellitus is a group of metabolic disorders, not simply hyperglycaemia or glycosuria. Two types of diabetes mellitus, IDDM and NIDDM, are basically two different diseases having the same problem of hyperglycaemia due to absolute insulin deficiency and relative insulin insufficiency respectively, together with the diabetic chronic complications. Their pathogenic mechanisms also differ from one another; IDDM develops as a result of autoimmunity triggered by environmental agents whereas NIDDM mainly due to genetic predisposition resulting in insulin resistance.

Clinical manifestations are variable, most often, hyperglycaemic symptoms like polydipsia, polyuria and polyphagia. Other acute complications like DKA, NHS and hypoglycaemia are frequent clinical problems. Chronic complications due to microangiopathy or macroangiopathy, bring a lot of suffering and mortality. Diagnosis is based on WHO criteria.

Management in form of dietary restriction, drug therapy, regular exercise, glucose monitoring, regular follow-up and complication screening are conducted by the diabetic care team. Success depends very much on the patients' attitude change and their own effort.

The principal clinical expressions of diabetes related cardiac diseases are:

1. Atherosclerotic heart disease
2. Cardiomyopathy
3. Autonomic nervous system dysfunction

Coronary Artery Disease

Atherosclerosis as the pathogenetic mechanism
Diabetes is an independent risk factor for the development of CAD.

Overall prevalence as high as 55% in diabetes vs. 2-4% in general population and generally they suffer from severe and diffuse cardiovascular diseases.
Syndrome X/ Insulin resistance syndrome.

Autonomic Neuropathy

Ominous sign for diabetes.

Absence of parasympathetic nerve fibres leading to a relative increase in sympathetic tone that results in resting tachycardia and elevating blood pressure with exercise, thus reducing myocardial blood flow and increasing myocardial demand for oxygen at the site of a coronary stenosis.

Sympathetic dysfunction leads to postural hypotension, thus reducing coronary perfusion pressure.

Acute Myocardial Infarction

Mortality among diabetes are alarmingly higher than non-diabetes, particularly among female and younger persons.

Congestive heart failure are more prevalent in diabetes than in non-diabetes.

During ischaemia, glucose uptake decreases in insulinopenia while excessive catecholamine further decreases insulin level. Lipolysis increases and FFA decreases glucose transport.

Independent preditors of mortality are Q wave AMI, prior AMI, female gender and insulin treatment prior to hospitalisation.

Mortality within 6 months following non-fatal MI are 60% among those with a previous MI and at 5 years following first MI are 79%.

Poor prognostic indicators are cardiac symptoms one month preceding infarction, pulmonary rales during initial hospitalization, PVC >10/min. before hospital discharge and EF<40% by radionuclide ventriculography.

Drug treatment and Intervention

Thrombolysis is relatively contraindicated in diabetes with proliferative retinopathy but no retinal haemorrhage were seen in 121 diabetes treated with thrombolytic agents in the TAMI trial.

Myocardial revascularization by PTCA is an effective tool with low associated morbidity but diabetes is the most important preditors of restenosis.

Bypass graft is associated with higher peri-operative mortality and morbidity. Late graft patency is similar to non-diabetes.

Aspirin has a significant and proven value in reducing cardiovascular mortality as diabetes have heightened platelet reactivity, leading to acceleration of progression of atherosclerosis and the development of an occlusive thrombus at the site of coronary plaque rupture.

Beta-blockers have been shown to reduce mortality following myocardial infarction. They attenuate reflex tachycardia and mask warning symptoms of hypoglycaemia and potentiate insulin induced hypoglycaemia.

Attention must also be focused on the modification of risk factors to reduce progressive atherosclerosis and the risk of reinfarction. Cigarette smoking should be stopped. Hypertension should be controlled. Hyperlipidaemia and obesity should be managed aggressively.

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Workshop

Setting Up Cardiac Rehabilitation

SETTING UP CARDIAC REHABILITATION PROGRAM

P. K. Mok

A. *How to Start*

1. Form a multi-disciplinary team

- Cardiologist
- Cardiac rehabilitation nurse
- Physiotherapist
- Occupational therapist
- Dietitian
- Medical social worker
- Psychologist

2. Appoint a coordinator

3. Define team members' role

4. Get support for the programme

- Administration
- Relevant staff
- Funding
- Hospital Authority

B. Planning of the Programme

1. Define patients' needs

- Modificatiion of lifestyle
- Physical activity
- Psychological needs

2. Identify patients entering criteria

- Post myocardial infarction
- Post angioplasty
- Stable angina pectoris
- Significant risk factor for ischaemic heart disease
- Controlled heart failure
- Post pacemaker inplantation
- Post by-pass graft surgery
- Post cardiac surgery for valvular and
- congenital heart disease

3. Develop content of the programme

Phases of cardiac rehabilitation programme

- in-patient phase (7-14 days)
- out-patient phase (3 months)
- community-based programme (6 months)
- long term maintenance phase

Contents of each phase

- educational programme
- exercise training programme
  in-patient exercise programme
  out-patient exercise programme
  low/ moderate / high intensity exercise training
- activity of daily living
- relaxation class

4. Determine resources and budget

Human resources

- staff salary, leave, inservice education

Material resources

- equipment : treadmill, bike, weights telemetry cardiac monitoring
- audio visual aids
- overhead : promotion leaflets and booklets stationary, photocopying, printing secretarial/ computer facilities

C. Implementation of the Programme

1. Document the programme

- No. of attendance
- No. of defaulted
- Date of entry
- Date of exit

2. Record patients' data

- Patients' clinical profile
- Patients' progress
- Patients' outcome

3. Develop policy and procedure manual

- Patients' exercise training and excluding from training criteria
- Manual of each discipline for each phase
- Degree of monitoring for low / moderate / high risk patients
- Emergency plan

4. Follow up patients' progress

- Cardiac clinic/ cardiac rehabilitation clinic
- Telephone contact

5. Evaluate the programme

- Record attendance
- Surveys, questionnaires, satisfaction survey
- Patients progress, exercise capacity, blood results
- Mortality and morbidity

CARDIAC REHABILITATION PROGRAM EVALUATION

Suet-Ting Lau

Need for Evaluation

Cardiac rehabilitation program has become an established management modality from the 1970s in North America and Eruope. The changes in rehabilitative care occured with the changing pattern of coronary disease.[1]

In the early years of coronary rehabilitation, most patients in exercise training programs were recovering from uncomplicated myocardial infarction. In subsequent development, patients with a complicated clinical course were considered for more limited and gradual exercise rehabilitation.

Currently more elderly patients and patients after coronary artery bypass surgery or coronary angioplasty are offered rehabilitation. Emphasis on exercise, education and behavioural change in coronary risk reduction, psychological, occupational and vocational counseling is different in different programs. Actually, there is no ideal rehabilitation program that will encompass the needs of every patient. Thus evaluation of the program with subsequent evolution will suit the needs of most patients with the resources available. (Fig 1)

Basic Evaluation

The evaluation for auditing and quality assurance purpose should include the contents e.g. timetable, staff lists, topic or subject lists, activity list, attendance records etc.

Outcome Evaluation

The assessment of the participants outcomes and changes due to the program; and most important and difficult is how much of the change can be attributed to the program. This has to be documented by research.

Different aspects could be measured including client opinion and satisfaction about the program. Both attenders and dropouts should be contacted for opinions. The cardiovascular health status such as blood pressure, resting pulse rate, blood lipids, weight, exercise capacity etc. could show improvement after the program but controls who are under 'ordinary care' have to be compare for improvement due to the program.

Knowledge and attitudes about the disease, interventions, medications, safe and effective exercise, healthy diet and smoking are also goals for the educational program. The effect on lifestyle and habits including diet, exercise, smoking and medication compliance could be assessed.

The benefits of exercise are well documented by research [2 3 4]. Meta analyses of randomized trials have calculated a significant 20% reduction in cardiovascular death [5 6]

Studies also showed benefits in quality of life, modification of lifestyle and economic use of health-care resources [7,8 9].

However, these outcome assessment has reflected the isolated concerns of different professionals, each addressing different factors of the problems of patients. With different approaches to assessment, there are discrepancies in findings probably related to the problems with assessment.[10]

Future Development

The broad scope of cardiac rehabilitation with the potential benefits in secondary prevention, reduced disability, increased productivity, improve quality of life and associated influences on health care cost would warrant further investigation and evaluation.

Further studies on the influence on ischaemia, restenosis after angioplasty, remodelling after infarction etc. are also very important.

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IMPLEMENTATION OF COMMUNITY BASED CARDIAC REHABILITATION PROGRAMME

Peter Poon and Dominic Chui

Cardiac Rehabilitation is the process concerned with the full development of each cardiac patient's physical, psychological, social and vocational potential. It is designed to restore the patients to an optimally productive, active and satisfying life, as soon as possible after the recognition of heart diseases.

The Community Based Cardiac Rehabilitation Programme is an innovative project which will provide the participants different means of rehabilitation in a community oriented setting. Together with the hospital based Phase I and II programme, we hope to provide an holistic approach so that the participants' potential can be fully explored and enhanced. The rationale of the project is of course not to duplicate or compete with the mainstream medical care, instead, we hope that through our participation, to consolidate the team members' knowledge acquired during the Phase I and II programme and their compliance. Furthermore, to facilitate the process of self help and mutual help, i.e. an better understanding of their own problem, self acceptance, be more responsible in self care and ultimately enjoy better quality of life through active participation and sharing with other that are going through the same process.

It is widely accepted that cardiac rehabilitation can roughly be classified into four phases. Hospitals are the main service providers for the first two acute phases, and the Community Rehabilitation Network will be please to participate in Phase. III and IV. With these in mind, our programme has the following five objectives:

1. To cooperate with different agencies and professional bodies in delivering health education on cardiovascular diseases to the general public.

2. To enhance the psycho-social well being of these patients.

3. To achieve a level of function compatible with each patient's occupational and recreational interest.

4. To introduce healthy life style concept and prevent re-occurrence of heart problems.

5. To reinforce the application of the skills and knowledge that the patients acquired in the institutional based Ph. I and II Cardiac Rehabilitation Programme.

Knowing that cardiovascular disease is a multi-factorial problem. We have incorporated different components in our programme. We have tried to be comprehensive but we know that the

programme cannot be exhaustive. The seven components in our program are:

Patient and Public Education

It aims at providing information on the disease process, treatment, risk factors modifications and avoidance, life style management, and the importance of psycho-social rehabilitation.

Gentle Exercise Programme

The grade exercise programme will be aiming at maintaining the physical status of the participants. It would be designed and progressed according to the performance and the needs of the participants. Knowing they are actually high risk patients and the very limited back up we have in the community, the programme would be gentle but interesting, with the safety of the clients placed at our utmost consideration.

Self Management Programme for Cardiac Patients

Many studies have proved the correlation between psychological and behavioural factors can play causal roles in causing risk factors (e.g. smoking, stress, hypertension and diet) which lead to cardiac diseases. In this respect, psychological and behavioural factors can thus play an important role to re-develop behaviours in reducing risk factors related to their illness and to re-establish interpersonal and social ties as well as occupational and recreational activities, which contributed in the process of rehabilitation.

Heart Walk

An outdoor exercise and socialised programme which aims at introducing the proper concepts of outdoor exercise and using walking exercise as a tool to strengthen the cardiac function. It will also provide an environment to enhance mutual supports amongst cardiovascular disease sufferers. after the training, the participants will be either referred to the already established walking team organised by the Care for Your Heart Self Help Group or to find the own walking buddies if appropriate.

Supportive / Therapeutic Group

rganise support groups for the cardiovascular disease patients and family members with facilitation's from different professionals such as cardiologists, social workers, physiotherapists, nurses and occupational therapists etc. Through sharing and group interaction, common concerns of patients are being identified are tackled.

Dietary advice and Cooking Workshop

It aims at providing information on different diet related risk factors for heart disease. Moderate changes in food selection and preparation can effect most of the recommended dietary alterations and habits. Dietary and nutrition advice will be provided through group meetings or practical training's which then be reinforced by cooking practises.

Care for Your Heart Group

A newly formed self- help group for the cardiovascular disease patients.

Characteristics of the group

- Common experience sharing among patients
- Mutual help and support
- Collective group spirit
- Exchange of information and development of coping mechanisms resulting in constructive action towards shared goals

Appendix

IMPLENTATION OF COMMUNITY CARDIAC REHABILIATION PROGRAMs

Worksheet

The objectives of this exercise are:

1. to identify needs of cardiac patients when existing the hospital based Ph. I & II cardiac ehabilitation programmes

2. to set clear objectives of the Ph. III (community based) programme

3. to list out various means of implementing the Ph. III programme, highlighting their advantages and disadvantages

Implementing community cardiac rehabilitation programmes

In a small group situation, please discuss the following topics:

(1) **Identifying needs of patient when exiting the hospital based programmes**
Needs- felt, expressed, nominative and comparative.

Felt needs-

Expressed needs-

Nominative needs-

comparative needs-

(2) **As a service provider, please list out the objectives of your programmes**

(3) **List out some of the possible means to implement the programme, highlighting their advantages and disadvantages**

NURSE ROLE IN CARDIAC REHABILITATION

Ms. Y. Y. Ho & Ms. K. P. Lam

The need for cardiac rehabilitation services is directly related to the prevalence of cardiovascular disease Nursing is an essential component of the cardiac rehabilitation process, to restore and maintain an individual's optimal physiological, psychological, social, and vocational status. The cardiac rehabilitation nurse assumes some of the roles discussed in this section.

Clinician

- uses the nursing process and performs the steps of assessment diagnosis, outcome identification, planning, intervention and evaluation in providing rehabilitative patient care

Health Teacher and Counselor

- identify each patient's risk-reduction priorities.
- emphasize the importance of behavioral change to manage cardiac risk factors through teaching.
- provide initial information and guidance for phychosocial concerns such as sexual activity, return to work, and social support.
- refer to other health-care specialists for expanded psychological counseling.
- participate in the selection and development of educational tools and programs.
- in addition to patient teaching, also promote cardiovascular health to families, interested community groups and the public.

Collaborator

- nurses contribute to the design of and strategies for the operation of the cardiac rehabilitation program.
- work with other health professionals to identify problems related to providers, equipment, facilities.

Case Manager

- identify patients in need of cardiac rehabilitation services.
- co-ordinate the resources to meet client's needs and provide comprehensive services
- prepare discharge summaries to the referring doctor.

Additional Roles

- organize team meetings, liaison with other members of the team.
- organize combined heart health promotions with other community.
- support and facilitate related research by others.

NURSE ROLE IN CARDIAC REHABILITATION

Wai-Chu Chan & Wai-Man Tsang

Introduction:-

The aim of cardiac rehabilitation programme is to assist patient with coronary heart disease back to the society especially after AMI. It is a combine care of allied health which includes physical ,psychological and social well being. Therefore, it is a multi-disciplinary job which involves doctors, nurses, physiotherapists and occupational therapists... etc.

Phases Of Cardiac Rehabilitation

American Heart Association	*Princess Margaret Hospital Model*
I. Inpatient	D2-D10: - Start from CCU in form of counselling and education. - 1-7 steps.
II Outpatient	2 Weeks: - Totally 5 sections (every Wednesday pm) - Low intensity exercise.
III Late recovery	After phase II : Refer patient to community rehabitation network.
IV Maintenance	Self- help group

Nursing Role In Cardiac Rehabilitation

1. Health care-coordinator:

- Coordinate with different disciplines members.
- Coordinate with in-patient, out-patient and community-based programme.
- Act as a bridge between patient and co-workers.
- Introduce the programme to patient and others multi-discipline co-workers. (programme promotion)

2. Health Teacher:

- Teach both patient and their significant others.
- Explain and help patient to identify his own risk factor.
- Explain the anatomy and physiology of heart disease.
- Explain the need, effect and side effect of each drugs they have taken.
- Explain and reinforce the need of diet change and activities limitation.
- Prepare patient and their significant others to handle unexpected situations.

3. Counsellor:

- Assess patient's response to diagnosis and the rehabilitation programme.
- Listen to patient's worries, problems and difficulties.

- Reduce patient's anxiety, increase his confidence and perception of control.
- Offer support system if neccessary e.g. social service etc.

4. Clinical supervisor/assessor:

- Assess patient's condition both physically and psychologically e.g. when to start rehabilitaton programme, vital signs during exercise, coping skill to his disease, improvement in condition...etc.
- Give advice on modification of lifestyle and give positive support.
- Provide guideline of activities and limitations of individual patient.

5. Researcher:

- Document patient's progress and response.
- Select important and interested data for further need.
- Analyse data and findings.
- Report and evaluate the whole programme.

Conclusion

Cardiac Rehabilitation is a multi-discipline job. In PMH, we include all the allied- health parties including doctors, nurses, physiotherapists, occupational therapists, medical social workers, dietitians and community nurses.

Phase I started at mid 1993 with around 100 patient per year.

Phase II started at oct 1994 and continue till now.

Phase III started to refer to Community Rehabilitation Network since 1994.

Phase IV pending to have patient self- help group.

New trend would like to include more groups of non-MI patiemt such as IHD,CHI and even pacemaker patients.

THE ADVISE APPROACH TO THE EVALUATION OF THE CARDIAC PATIENT

Susan Quaglietti

In high risk or diseased populations, cardiorespiratory assessment is carried out in a sequential order starting with the medical history then following with the physical exam, chest x ray, ECG, and the exercise test. The results of these evaluations are then analyzed and used to decide whether further testing is required.

The Key Empirical Features

The ***ADVISE*** approach, using five key empirical prognostic features, is a logical and efficient way to evaluate all patients who present with cardiac symptoms and signs. The five key empirical prognostic groupings of heart disease, representing the basic pathophysiological mechanisms of the symptoms and signs that we treat, provide an organizational structure. This approach requires that you actually consider the ***ADVISE*** spreadsheet (**Insert** 1) on every patient you see.

The following explains the basis of the ***ADVISE*** key features:

1. Arrhythmia's have multiple mechanisms, symptoms and syndromes. The mechanisms include atrial and ventricular origins, bradycardia, tachycardia and heart block; symptoms include palpitations, syncope, dyspnea and fatigue; syndromes include paroxysmal atrial tachycardia (PAT), atrial fibrillation, complete heart block and sudden death.

2. Myocardial ***D***amage or ***D***ysfunction are the pathophysiologic basis of the most common causes of heart muscle disease.

3. Myocardial ***Is***chemia is the pathophysiologic basis of coronary artery disease.

4. ***V***alvular dysfunction is mainly due to insufficiency (causing regurgitation) or stenosis (causing obstruction). The main lesions of concern are aortic stenosis (which causes myocardial damage and ischemia) and mitral insufficiency (which can lead to myocardial damage).
5. ***E***xercise intolerance is associated with symptoms of dyspnea and fatigue with exercise which can be due to inactivity (deconditoning) and many disease processes. It is included as a key feature because of its' independent and consistent impact on prognosis.

First the History and Physical Exam, then Consider Tests!

The medical history and physical examination establish the pre-test probability and determine if further tests are indicated and determine which tests are indicated. The basic tests are the electrocardiogram (ECG) and chest x-ray; most patients being evaluated for a cardiorespiratory problems need these two tests. Beyond the basics, the usual tests include the echocardiogram (for valve status and left ventricular function), stress tests (for ischemia, exercise capacity), nuclear tests, and Holter monitoring (for arrhythmias and syncope). Specialized tests other than cardiac catheterization include cardiac tomography, positron emission tomography, and magnetic resonance imaging. In general, these are only needed for unusual conditions and their performance characteristics have yet to be demonstrated.

Many studies have proven the importance of the history and physical exam. For instance, the major symptom and syndrome of ischemia, angina pectoris, is associated with a 90% probability for obstructive coronary artery disease in a middle aged male; the other major syndrome, CHF (with the symptoms of shortness of breath on exertion and fluid retention), is associated with a 25% annual mortality.

The Importance of the Key Empirical Features

The key empirical prognostic features are important because they are the basis for the following:

1 - Explaining symptoms: shortness of breath (SOB) and chest pain have many causes, but the mechanism should be sought out. Are they due to myocardial dysfunction or ischemia?

2 - Making the diagnosis: e.g., a middle aged male with exertional sub sternal chest pain brought on by exercise or anger (that is, angina pectoris) has a 90% probability of having coronary artery disease.

3 - Determining which tests are needed: screening asymptomatic individuals is inappropriate because of the false positive rate and the problem of mis-labeling while other clinical groupings are appropriately tested.

- which tests for ischemia? (stress tests or coronary angiography)
- which tests for damage? (echocardiogram, nuclear multi-gated acquisition (MUGA) for left ventricular function, left ventricular angiography).
- which tests for valvular dysfunction? (echocardiogram [ECHO], cardiac catheterization [CATH]),
- which tests for arrythmias? (ECG, Holter)
- which tests for exercise intolerance? (treadmill or ergometer test)

4 - Directing therapy: ischemic chest pain should be treated to alleviate pain, but many patients are treated for non-cardiac pain with anti-anginal medications.

5 - Indicating the need for interventions: if the symptoms associated with the key features cannot be tolerated or treated medically, the physician and patient must consider surgery or other interventions with increased risk.

6 - Determining prognosis independently: each of these features has independent predictive power for determining risk of cardiac death.

Cell By Cell

The patient enters the ADVIsE approach with his/her chief complaints and test results from previous evaluations. The complaints could be new, exacerbated, recurrent or chronic. The first step is to take a detailed, structured history, then review any available test results from the physical exam and previous evaluations. The following sections provide an overview of the basis of the features and gives a cell-by-cell description of how each of the features of heart disease can be assessed by the history, physical exam and the tests for evaluating patients currently available. Myocardial dysfunction is the first row and the approach will be to step across each of the procedures used for evaluating it. The first cell explains how the cardiac history applies to the assessment of myocardial dysfunction.

Myocardial Dysfunction or Damage (Row 1)

Pathophysiology

Myocardial damage is the pathophysiological basis of heart muscle disease. Myocardial dysfunction can be divided into systolic and diastolic dysfunction. Systolic function relates to the emptying characteristics of the left ventricle, and diastolic function relates to its filling properties. Systolic dysfunction due to myocardial damage is most common and usually leads to left ventricular dilation. The ventricle dilates to take advantage of the Frank-Starling relationship (i.e., increased contractility with stretching of the sarcomeres). Anything that causes ventricular damage or scarring (e.g., muscle loss) leads to systolic dysfunction.

The most practical measurement of myocardial damage/systolic dysfunction is ejection fraction (EF). EF is the percentage of the end diastolic volume ejected with each contraction (normal is 55-70%). Although it can be affected by heart rate, afterload and preload, EF is inversely related to the severity and complications of myocardial infarction or valvular disease. In coronary artery disease, it has an independent impact on mortality. Even patients with left main coronary artery disease have a better prognosis if their ejection fraction is normal, and patients with single vessel disease have a worse prognosis if their ejection fractions are low. Patients with ejection fractions of 30-50% seem to benefit the most in terms of longevity from bypass surgery while those with ejection fractions less then 30% have a higher surgical mortality. EF can be misleading in patients with mitral regurgitation because of the unloading effect of the regurgitation.

Approximately 80% of patients with congestive heart failure have systolic dysfunction, while the remainder have diastolic dysfunction. In patients with the latter, EF can be normal but filling pressure is elevated due to a stiff, non-compliant ventricle. Usually, diastolic dysfunction is secondary to hypertension, pathological hypertrophy, infiltrative diseases of the myocardium and, at times, ischemia.

Definition of CHF

Congestive heart failure can be defined as a syndrome consisting of:

- signs and symptoms of intravascular and interstitial volume overload,

including shortness of breath, rales, and edema; and
- manifestations of inadequate tissue perfusion, such as fatigue and poor exercise tolerance.

Symptoms and Physical Exam for Myocardial Damage

The symptoms and physical findings of the major syndrome due to myocardial damage (congestive heart failure) include the historical features (and symptoms) and physical findings of left sided failure and right sided failure.

Left sided: Patients report symptoms of fatigue, dyspnea on exertion, and paroxysmal nocturnal dyspnea. They usually have a history of myocardial infarction, alcoholism, myocarditis, or hypertension. The following are precipitators for episodes of CHF in patients with systolic dysfunction: atrial fibrillation, excessive salt intake, Illness, myocardial infarct, and non-compliance. Physical findings include an S3 gallop, cardiomegaly, and rales.

Right sided: Patients report weight gain and swelling. The most common cause of right sided failure is left sided failure.
Physical findings include edema, hepatomegaly, neck vein distention, and abdominal swelling.

Evaluation Options

The options for evaluating myocardial dysfunction and/or damage include:
- Physical exam (heart size, apical impulse, gallops)
- Chest x-ray and ECG
- Echocardiogram - mitral regurgitation can be seen with echo-doppler, while it is not seen using other non-invasive modalities. This factor makes echo the preferred modality for evaluation of myocardial function and mitral regurgitation.
- Radio nuclide ventriculography - based on radiation counts in an area, so no geometric assumptions are required.
- LV angiography - the equations are based on a proloid ellipse, therefore Simpson's rule is more appropriately used; biplane views are more accurate. Regardless of any limitations, this remains the "Gold Standard."

Ejection fraction (EF) is the best index of myocardial function. This is the percentage of end diastolic volume expelled with each cardiac contraction and is calculated using the following equation: EF=EDV-ESV(which equals Stroke Volume) divided by EDV). It can be estimated using any of the techniques above.

Myocardial Ischemia (Row 2)

Myocardial ischemia is important to document because it forms the pathophysiological basis of angina pectoris and indicates underlying coronary artery disease or coronary artery spasm. The manifestations of myocardial ischemia are angina pectoris and exercise-induced ST-segment depression, regional (wall motion abnormalities) and global myocardial dysfunction, and thallium post-exercise defects (that fill in later post-exercise or are not present during a resting scan).

Pathophysiology of Ischemic Syndromes:

- Inadequate supply of oxygen, increased demand for oxygen
- Secondary causes are aortic stenosis, hypertrophy, and anemia.
- Primary causes (due to coronary artery disease) are fixed atherosclerotic lesion and/or change in tone (spasm), and thrombosis.
- Confounders are esophageal reflux, silent ischemia, pulmonary HBP, pericarditis, aortic dissection, variant angina, and costochondritis.

Symptoms and Physical Exam of Angina Pectoris

The major presentation of myocardial ischemia is typical angina pectoris:

- Characteristics - a dull pressure or squeezing sensation; usually a dull pain and never a sharp pain
- Precipitated by exercise or anger
- Location - sub-sternal, radiation down left arm and to the neck
- Timing - occurring during and up to 6 minutes after exercise and lasting for minutes
- Relieved by resting and sublingual nitroglycerin (NTG)

Any prior cardiac or atherosclerotic event or procedure is a historical feature that makes ischemia more likely to be the explanation of chest pain. Confounders are when the patient presents with multiple types of pain, stoicism or fear to identify a sensation as pain, concern over normal sharp pains, referral of pain over old injuries, chest pains associated with pulmonary disease, and ischemia due to aortic valvular disease or ventricular hypertrophy.

The physical findings that can be associated with angina include tendon xanthoma, ear lobe creases, arcus senilis, and peripheral arterial bruits, but these are not always present in ischemic patients.

Symptoms and Physical Exam of Myocardial Infarction

Myocardial infarction (due to prolonged ischemia that results in damage to the left ventricle) is characterized by:

- Prolonged anginal pain
- Myocardial enzyme rises
- ECG changes

The physical findings that can occur include gallops, rub, murmur, and a precordial bulge, but these are often neither present nor appreciated. Neck vein distention can be due to CHF or right ventricular infarction.

Evaluation Options

Exercise ECG with treadmill - ***the first choice for cost-effective evaluation of the patient with chest pain!*** If the clinical impression is that the treadmill result is a false positive or a false negative, then go on to the next best test available. This could be coronary angiography but a nuclear perfusion test or exercise echocardiographic study would be acceptable to access ischemia.

Exercise add-ons: echocardiogram, nuclear perfusion for increased sensitivity, localization, or if ECG shows left bundle branch block or Wolfe-Parkinson-White syndrome.

1. Holter (ambulatory monitoring) - ECG during everyday activities
2. Pharmacologic stressors (if patient cannot exercise or gives an inadequate response/effort to an exercise test)

- Persantine or adenosine administration with imaging using thallium or isonitriles (sestimibi)
- Dobutamine or arbutamine administration with imaging using echocardiography

Prognosis and the Ischemic Syndromes

- ***Myocardial Infarction***: 10% die prior to admission (this could be decreased by patient education and bystander CPR), 10% die in-hospital (Aspirin, thrombolysis and beta-blockers have decreased this by 25%), and 10% die in the 1st year after hospital discharge (beta-blockers lower mortality if given during this period by 25%). An MI can be classified as complicated when shock, CHF, or ischemia occur versus uncomplicated when these do not occur. Mortality is concentrated in those with complicated MI's and/or those resulting in an abnormally low EF.
- ***Angina Pectoris***: Stable angina pectoris has a 2% annual cardiac mortality and unstable angina pectoris has a 4% rate.

Valvular Function (Row 3)

Valvular dysfunction manifests itself as insufficiency (causing regurgitation) or stenosis (causing obstruction). ***The Echocardiogram is the first choice for cost-effective evaluation of the patient with possible valvular disease.*** The main lesions of concern are aortic stenosis and mitral insufficiency. Mitral stenosis is very rare in developed countries. Aortic insufficiency is well tolerated because it is associated with flow work rather than pressure work, therefore the only concerns in ambulatory care are antibiotic prophylaxis to prevent sub acute bacterial endocarditis (SBE) and sudden worsening of the valve's dysfunction. When caused by cystic medial necrosis and Marfan's syndrome, AI is more alarming because it can result in aortic dissection and sudden death.

Exercise capacity (Row 4)

Exercise intolerance is associated with symptoms of dyspnea and fatigue with exercise, which can be due to inactivity as well as many other disease processes. The exercise capacity of a patient has an independent effect upon his or her prognosis in heart disease. The amount of exercise that a patient can do is determined by both central cardiac, pulmonary and peripheral features.

Ventricular Arrhythmias and Atrial Fibrillation (Row 5)

Arrhythmia's have multiple mechanisms, symptoms, and syndromes:

- Premature ventricular contractions (PVCs) which can cause palpitations but their risk depends upon associated diseases,
- Premature atrial contractions (PACs) which are totally benign,
- Supra ventricular tachycardia which can cause palpitations, angina, CHF, and rarely syncope
- Ventricular tachycardia which can cause syncope and sudden death
  Atrial fibrillation which can occur in patients free of heart disease ("lone"), or in patients with cardiac disease; it can precipitate CHF in patients with cardiac dysfunction but it's major risk is cerebral embolic stroke.
- Heart block which can cause

Ventricular arrhythmias should be classified as to frequency, form, and timing relative to the T-wave. In general, the

malignancy or prognostic implications of ventricular arrhythmias and atrial fibrillation (AF) relate to "the company they keep." In other words, frequent PVCs, atrial fibrillation, and even ventricular tachycardia may occur in healthy individuals and not indicate high risk, while in the patient with a cardiomyopathy, valvular disease, or acute myocardial infarction, they may be problematic and dependent risk markers.

Atrial fibrillation results from a circus dispersion of conduction through the atria with suppression of sinus node activity. Loss of the atrial kick and rapid conduction through the AV node can result in symptoms of fatigue and shortness of breath. The latter can be controlled by slowing conduction through the AV node with digoxin or calcium antagonists. Patients must be anti-coagulated to avoid cerebral emboli, the major danger of AF. Most supra-ventricular rhythms are benign and their danger is really due to associated conditions; e.g., tachycardia can precipitate ischemia in a patient with coronary disease or can precipitate CHF in a patient with valvular disease or LV dysfunction.

Heart block can be due to structural disease (degenerative or acute), ischemia or infarction, high vagal tone, medications and electrolyte abnormalities. Third degree heart block usually requires an electronic pacemaker.

Confounders

Your focus should be on the most common and usual presentations, but there are confounders that simulate the five key prognostic groupings:

1. Myocardial damage: its most common presentation is CHF; confounders are anxiety, diastolic dysfunction, athletic heart, thromboembolism and pulmonary disease including pulmonary embolism, cardiac tamponade and radiation heart disease; rare situations which simulate myocardial damage are high output failure and right ventricular infarction.
2. Myocardial ischemia: its most common presentation is angina pectoris; confounders are esophageal reflux, pulmonary embolism or pulmonary hypertension, aortic stenosis, pericarditis, costochondritis, variant angina, aortic dissection and silent ischemia.
3. Valvular status: its most common presentations are CHF or angina; confounders are functional murmurs, ASH (IHSS), bacterial endocarditis, Marfan's syndrome and serious mitral valve prolapse.

   Exercise intolerance (or capacity): its main presentation is exercise intolerance; confounders are deconditioning, pulmonary disease, obesity, and good endurance but decreased aerobic capacity (e.g., the patient who claims to be able to walk miles but takes all day to do so).
4. Arrhythmias: their main presentations are palpitations, syncope, and sudden death; confounders are anxiety, vasomotor syncope, the long QT syndrome and right ventricular dysplasia.

Workshop

Exercise and Cardiac Rehabilitation

PLANNING AND CONDUCTING AN EXERCISE PROGRAM

Yuet-Ming Liu & Kam-Fai Mo

The guidelines for conducting a low graded (intensity) exercise program in the cardiac rehabilitation Phase II Program

I. *Ingredient of the Exercise program:*

- initial assessment (or pre-exercise assessment)
- home walking program
- briefing sessions
- group warn up exercises
- individual exercise circuit in a group setting
- cool down exercises

II. *Personnel Involved:*

- all together need around 4 medical professional staffs for a group of 12 patients in a combination of around 10 old patients and 2 new patients
- physiotherapist must be involved (at least one) the other members could be:

occupational therapist / register nurse / CCU nurse / other medical professions trained in the field (they are for monitoring of the patients as well as teaching the exercises in the circuit after they have learned it from the physiotherapist)

III. *Teaching the exercises:*

- audio-visual aids
- demonstration
- repetition
- companion
- reinforcement

IV. *Precaution & Monitoring:*

- know the general condition of the patient

- know the past medical history of the patient
- know the cardiac condition of the patient(+/- the pulmonary condition)
- know the medication of the patient
- know the intensity of the exercise
- know the reliability and the availability of different monitoring factors (H.R. / B.P. / E.C.G. / RPE scales / Cardiac Enzyme level / patients' S/S / ward mobility attended etc.)
- forms for recording pre-/during/post- exercise condition guidelines to fill in the forms

V. ***Home Program:***

A. walking program

B. warn up & cool down exercises (with pictures to illustrate)

our goals are :

1. to help the patients to know **why** do they need the home program
2. **how** practically can they have their home program correctly
3. **keep** them doing it as a **habit**

- explanation (with notes) clear instruction (with notes)
- precautions (with notes)
- guidelines for monitoring (with notes)
- guidelines for progression or regression (with notes)
- co-ordination with phase I program
- teach them how practically can they plan and practice their home program
- forms / method for the patients to have self record on their progression
- repeat the importance of the home program to the patients in each sessions
- check their self recorded progression form

GUIDELINE FOR CONDUCTING A MODERATE / HIGH INTENSITY EXERCSE PROGRAM IN CARDIAC REHABILITATION PROGRAM

I. ***Assessment of Patient:***

A Patient particulars

B Recent history of cardiac attack or disease

C Past medical history and premorbid status

D Results of any investigation and intervention

E. Medication

F Home and working environment

G Job nature

H. Hobbies and leisure

I. Physical statue after the disease

J. Contra-indications for exercise

II. ***Categorization of Patient:***

A Risk stratification -- low or intermediate risk

III. ***Exercise Prescription:***

A. Mode of exercise -- ? training, ? patient's interest, ? demand

B. Intensity of exercise -- by heart rate (HR)

- by metabolic equivalent (METS)
- by ratings of perceived exertion (RPE)

C. Frequency of exercise

D. Duration of exercise

E. Progression and regression

IV. ***Preparation of Patient:***

A. Briefing sessions

B. Explanation and demonstration

C. Monitoring and recording

V. ***Conducting Exercise Session:***

A. Warm up exercise ---
- cardiac-pulmonary
- physical

- mobilizing
- stretching

B. Training: close monitoring by telemetry, ECG, HR, BP, RPE, abnormal sign & symptom --- rest period in between --- recording

C. Cool down exercise

D. Recovery period and recording

E. Advice on any delayed S / S

GUIDELINE FOR PLANNING EXERCISE PROGRAM IN CARDIAC REHABILITATION PROGRAM

I. Resources consideration:

A. Manpower or professionals involvement

B. Space

C Equipment

D. Environment factors

E. Supporting facilities

II. Choose of Training :

A. Continuous training

B. Interval training

C. circuit training

D. Fartlek training

III. Choose of Exercise:

A. Aerobic / anaerobic

B. Isometric / isotonic / isokinetic

C. Large muscle group / small muscle group

D. Physiological / functional

E. breathing control

F. Specific muscles group (e.g. muscles for heavy object lifting)

IV. Patient Selection:

A. Cardiac medical / cardiac surgical

B. Risk stratification

V. How to Carry Out:

A. Initial assessment (pre-exercise tests and patient's history)

B. Exercise prescription and protocol - Phase I
Phase II
Phase III

C. Monitoring before, during and after exercise

D. Advice and precautions

E. Recording and evaluation

F. Post-training assessment

G. Patient's follow-up and continuation of home program

*H. Emergency procedure

THE GUIDELINES FOR PLANNING EXERCISE PROGRAM IN CARDIAC REHABILITATION

What Exercises :

- aerobic or anaerobic ?
- isometric / isotonic / isokinaetic ?
- large muscles / small muscles ?
- physiological / functional ?
- respiratory muscles ?
- specific muscles group (e.g. muscles for lifting heavy object)

What Precautions & Monitoring

- know the general condition of the patient
- know the past medical history of the patient
- know the cardiac condition of the patient(+/- the pulmonary condition)
- know the medication of the patient
- know the intensity of the exercise
- know the reliability and the availability of different monitoring factors (H.R. /
- B.P. / E.C.G. / RPE scales / Cardiac Enzyme level / patients' S/S / ward mobility attended etc.)
- forms for recording pre-/during/post-exercise condition
- guidelines to fill in the forms

How to Carry Out :

- pre-exercise assessment
- monitoring devices
- clear instructions
- get the patient's understanding and co-operation

  teaching materials (visual aids; repetition; demonstration)
- monitoring during the exercises
- post-exercise assessment
- follow-up learning & practice
- home exercise program (explanation, instructions & teaching materials)

- report of home program progress

How to Progress or Regress :

- better to under-treat than to over-treat
- start with more considering step / exercise intensity
- with reference to the patient's present cardiac and medical condition
- with reference to the patient's current ward mobility
- with reference to the patient's RPE scales & ↑ in H.R. & B.P. change of the previous exercise session
- with reference to the patient's performance during the exercises

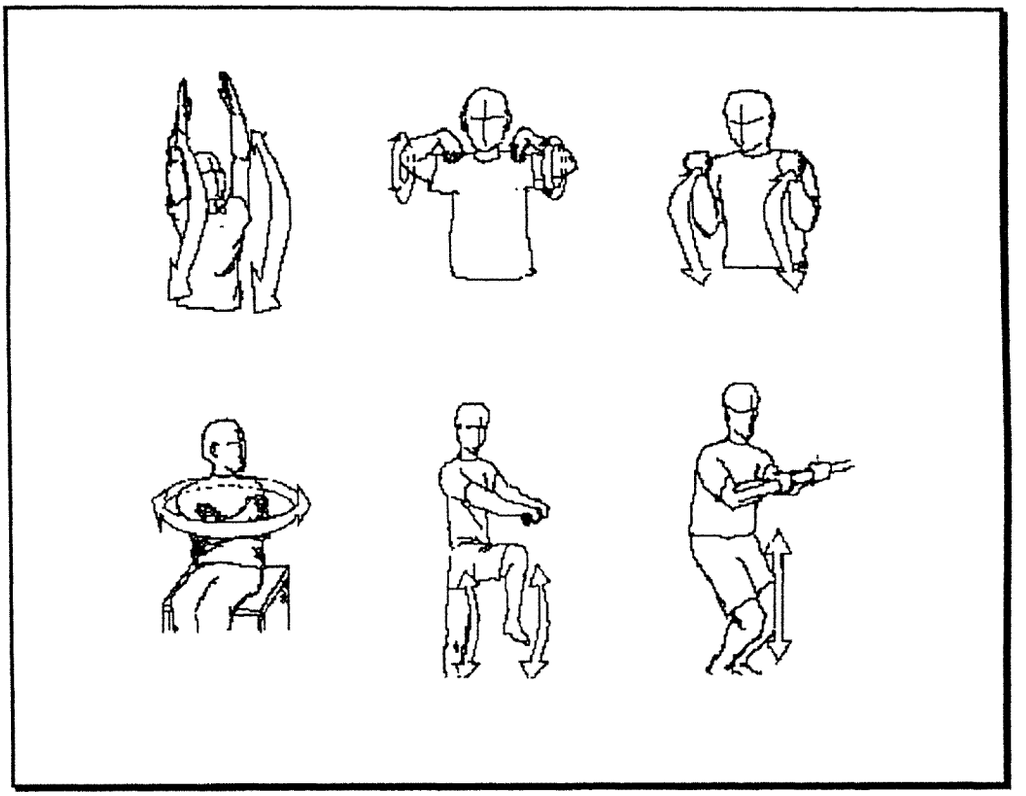

Fig. 4 Warm up and Cool Down Exercise

Workshop

Helping Patients Modify Their Lifestyle

CONDUCTING GROUP MANAGEMENT AND COUNSELLING FOR CARDIAC PATIENTS

Cecilia Chan

"Heart attack is a misnomer. The heart never attacks you. It is the source of your life" - B. Cortis.

Our heart is the vital engine that keeps us going. Any threat of a heart dysfunction will be life threatening. Patients with Coronary Artery Disease report that they have experience of death by saying that 'I step in and out of the death gate'. The experience of life and death, the discomfort and disability to come, the loss of job, income, sense of control, pride and self-esteem may result in social and emotional stress on the patients and their family members. It is therefore, important for us to understand their psychosocial needs and provide them with counselling support and group management.

Approaches in Groups Management and Counselling

We contact our patients individually and in groups. Groups can be a very effective medium of change and growth. Groups can be run in the ward, in the out-patients clinic and in the community.

1. Empowerment Approach

Miller (1989) stressed the importance of an empowerment approach in helping chronic patients. The empowerment include mechanisms to help patients to re-gain a sense of control through knowledge and information, to re-establish self-esteem and positive self-concept through affirmation and support, to increase social support to make life more bearable, to change belief system about health and illness so as to inspire hope and increase motivation in compliance and rehabilitation[1].

2. Psycho-Educational Approach

One of the key anxiety among patients is the lack of information and knowledge about what is going to happen to them next. The psycho-educational approach is popularly used in medical settings which combines counselling and education together. The approach emphasis on the social and emotional needs of the patient. The health professionals would provide emotionally support and counselling side by side information giving[2].

3. Self-Help Approach

The self-help approach is popular in medical settings because no professionals know the illness better than the patients themselves. Patients can provide each other with emotionally support, practical tips and useful experiences, emotionally rapport of being in the same boat which no one else could share. When survivors contribute as helpers, they benefit by the helper-therapy principal. Heart patients will have to constantly watch their diet, exercise, and lifestyle. When they become helpers, patients remind themselves as well as others of these essential health care controls. The fact that they become helpers provide them a sense of achievement and self-esteem, patients comply better once they become a helper.

4. Resource Centre Approach

Information and resource are important source of support for the patients and family members. There are Heart and Stroke Foundation Centres in many countries which offer resource centres and libraries where patients and family members can seek information from. These centres also provide counselling and support to patients. In Hong Kong, the Patient Resource Centres of hospitals may offer similar services. The community resource centre on heart health has yet to be established so that primary preventive work can be launched.

5. Body-Mind Approach

"There is nothing the body suffers that the soul may not profit by" - George Meredith.

If we take life as a process of continuing education and learning , having an illness may be a major learning lesson for us. In the connection of body-mind-spiritual wellbeing, the essential question to ask is 'what do we get out of this experience?' Some of the patients take the illness as a challenge to their existing lifestyle and change their life philosophy after the heart disease[3]. A large number of patients also seek alternative methods of healing which include music, art, aromatherapy, meditation, relaxation, religious practice, and herbal medicine.

Skills and Techniques

In working with patients in Hong Kong, we shall have to develop cultural sensitive techniques of counselling and support. The following are some of the skills that we can use:

1. Cognitive Approach

Patients may ask 'Why?' 'Why me?' 'How can this happen to me?', or 'How can this happen to my family member?'. These are denial questions as the situation is hard to swallow. We may adopt culturally relevant concepts such as 'Life is unpredictable' (無常'), 'Life is a suffering' (苦) to show that we appreciate how difficult it is for them to go through such experience. The technique of reframing and cognitive restructuring may be used by means of a joke such as 'Something loss, something gain' 'trauma can be turned into a blessing' (因禍得福). The blessing may be in terms of care and concern of family members, early retirement, spiritual growth, a healthier lifestyle.

Other techniques of self-instructions, reality orientation, NLP (neuro-linguistic programming), reminiscence may all be used to help patients to establish a new concept of the illness and life, and come to terms with reality[4].

2. *Behavioral Approach*

In the change of diet, exercise and lifestyle, patients need a lot of help in acquiring new skills as well as being persistent in the lifestyle change. We have to provide patients with specific instructions, demonstrations in skills training, good models of survivors who change and grow after the illness. Positive reinforcement is very important for the success of the programme. Family members as well as the patients must be trained in giving rewards to constructive behavioral change so that the desirable behaviour can be formed into habits.

3. *Logotherapy*

In the cognitive and spiritual level, patients would feel much better if their 'Why?' questions are being answered. If they can develop a meaning out of their suffering, they may acquire much energy in positive coping. We can facilitate their search of meaning by involving survivors who coped well, pastoral care workers, volunteers who have develop meaning out of their own suffering, into the helping process. Books, tapes and stories may all help in helping patients in arriving in a cognitive and/or spiritual solution.

Counselling Techniques

1. Letting go of Type A Behaviour: Mood Control and Anger Control

Anger and hostility are often being associated with patients with heart diseases[5]. Drastic emotional reactions to events and mood swings may lead to subsequent attacks. It is therefore necessary for patients to learn to control their moods and control their anger. Behavioral techniques of 'count ten', deep breathing, time out would help. But controlling negative behaviour and mood is not enough. We must build up positive moods and behaviour which is more crucial to the emotional wellbeing of the patient.

2. Meaning of Life and Self-Esteem: Affirmation and Prayer

Mind control methods of positive affirmation, reassurance, support and prayers are very helpful in the establishment of meaning in life, accepting limitations and losses while maintaining a positive self-esteem[6]. When the patient is secure and comfortable with oneself, nothing hurts any more.

3. Positive Moods: Meditation, Relaxation, Visualization

Appreciation of life and a sense of gratitude is the source of positive moods. Relaxation techniques, visualisation, mediation can contribute to the maintenance of a stable emotion[7]. Exercise and frequent practice is the only road to success.

4. Peace of mind: Forgiveness, love

Besides self-acceptance, forgiveness of oneself and other people, love for oneself and mankind are the ultimate source of energy in maintaining a peace of mind[8] The sense of integrity when we have demands and expectations on others may be the primary source of joy and fulfilment.

Conclusion

"Where there is love for mankind, there is love for the art of healing." - Hippocrates.

It is a privilege for us to be able to learn and work with cardiac patients. As life is short and unpredictable, they teach us to appreciate life and people around us more. Patients learn from each other as it is a valuable opportunity for them to encounter people with similar life threatening experiences, to learn and appreciate this growth challenge together.

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PRINCIPLES OF BEHAVIOR CHANGE, SMOKING CESSATION AND OBESITY CONTROL

Peter Lee

Obesity and Weight Control

ob = over
edere = to eat

Obesity: excessive amount of body fat
average: male 14%
female 24%

technically anyone with excessive composition of fat is obese
(has to rule out medical complications
e.g. Prader-Willi Syndrome)

Measurement

- hydrostatic weighing (density based on volume and weight----> fat contents)
- skinfold thickness
- height-weight table: 20% (minimum) - 30% (men) - 40% (women) above ideal

Health Risks

- increases risk of death
- glucose intolerance
- increased risk of DM
- elevated blood pressure (increased water cell content ---> increase pressure in cell membranes)
- increased serum lipid level
- cholesterol) negatively associated with obesity

reduction in weight and fat contents → reduces risk factor

Goals

1-2 lb. per week
by:

- management of eating and
- exercise behaviours

Change:

change of cognitive and emotional antecedents and consequences to eating

Rx approaches for obesity:

- too much food
- too little exercise

Eating Management

Behavioural Modification

Self monitoring:

daily self-monitoring food diary:
day/time
H: hunger: none, slight, moderate, extreme
M: mood: depressed, bored, frustrated, guilty, happy, neutral

eating and exercise behaviours are under the influence of situational and contingency variables associated with the behaviours

Aim: to change of cognitive and emotional antecedents and consequences to eating

- availability of food
- exercise opportunities
- eating situation

influence of family, friends, and society

- boredom
- depression
- anxiety
- stress reducing

Therapeutic Components:

Self monitoring

- food diary
- body weight monitoring
- awareness of maladaptive eating and exercise habits
  e.g. "recreative overeaters"
  e.g. eating styles
- preplanning snacks and mealscaloric information

Stimulus control

which events precede eating episodes, e.g. TV, reading, sight of high-calorie food reduction in no. of environmental cues associated with food by eating only in designated places

- limit place and times of eating
- use of special plates and bowls
- reduce exposure to danger cues

1. limit cues associated with eating
   eat in specific room, at specific place
2. do not eat to avoid waste
3. restrict your food intake ahead of

- time
- put other food away
- prepare small quantities

4. make fattening foods less available and non-fattening foods more available

- never shop with an empty stomach
- keep supply of "safe" food available at all times

5. modify the physiological cues for eating

- eat high bulk low calorie foods
- eat high-protein foods
- avoid craving for sweet foods

6. arrange social cues that encourage appropriate eating

- eat only with people who eat moderately

develop non-fattening responses to emotional upset, anxiety and depression

Slowing down eating

- satiety takes about 20 minutes
- slow down, eat less
- change rate of eating

The eating process

- eat slowly
- swallow before eating again
- chew slowly
- reduce the quantity of a bite or mouthful

Contingency Management

- systematic application of +/- consequences to patients' dietary behaviours
- behavioural contracting

Other Techniques

- covert sensitization
- overt aversive conditioning

Maintenance of Appropriate Dietary Habits

form positive eating habits

Exercise Management

Increasing Aerobic Activities

increasing activity levels:

- aerobic exercises may become self-reinforcing and habit-forming, also lead to feelings of well-being
- sense of exhilaration during exercise
- playfulness
- exercise "high" that lasts for hours
- relaxing, anti-anxiety effects
- antidepressant effects
- greater energy during the day
- better sleep
- improved body image
- reduced stress reactivity
- mental clearing
- more enjoyment of food without excessive eating
- sharpening of intellectual performance
- slowing down of ageing process
- heightened sensory awareness

- increase routine activity: park further, get off two stops earlier
- use stairs instead of liftexercise
- plan: routine exercise

*30 minutes each time (only after that duration will body rely on body fat stores for energy production)

Motivational Analysis

ensure training to be gradual, not exhaustive and burdensome

Social Influences

convince others of the importance get company

Cognitive Factors

- expectancy of success, self-efficacy
- efficacy of treatment plan as perceived by patient
- perceptions of hedonic consequences of aerobic exercise
- perception of psychological benefits of aerobic exercise
- body image when exercising in public

Stress

reduce stresses in patients' life

life stressors: family - work
time stress

reduce cognitive urges to overeat

Hypnosis: (?)

magical mystic
hypnotic suggestion for weight loss varies:

- aversive conditioning
- decrease appetite
- Effectiveness?

Other Methods

- appetite suppressant pills
- a list of permissive foods patients can eat

- fees determined by amount of weight loss

Cognitive-Behavioural Treatment Program:

Assumptions:

dysfunctional thinking may play a role in maintaining problematic eating

- increase awareness of thoughts
- understand how such thoughts influence eating and exercise habits
- increase positive coping thoughts to mediate positive eating and exercise behaviours

In Combination with Behavioural Modification:

- preplanning snacks
- eating only in designated places
- reducing eating cues
- eating slowly
- behavioural contracting

Self monitoring
(emphasis of giving patients' rationale: to change a behaviour must first be accurately observed)

- homework
- screen for unusual physical factors
- skills orientation

Cognitive Self Control Procedures

Greek: "know thyself"→ **"know thy controlling variables"**

human behavioral change result from
- environmental consequences and
- self-evaluation (self-approval or self-criticism)

Contingency Contracting

Behavioural Programming:
(self-presented consequences)

- self reward
- self punishment
- cognitive self-evaluation

Thoresen and Mahoney (1974):

1. self observation:
   recording, chatting, display of information relevant to a controlled response
2. positive self reward:
   self-administration of a freely available reinforcer ONLY after performance of a specific, positive behaviour
3. negative self-reward:
   avoidance, or escape from a freely avoidable aversive stimulus ONLY after performance of a specific positive behaviour
4. positive self-punishment:
   removal of a freely available reinforcer after the performance of a specific negative response
5. negative self-punishment:
   presentation of a freely avoidable aversive stimulus after the performance of a specific, negative response

Rx issues:

- therapist's competence
- treatment effectiveness: just will power?
- lack of rapid success
- too busy
- sabotage (significant others in life)→ assertive responses
- poor attendance and non-compliance with homework

RETURN TO WORK AND ADVICE ON ACTIVITY DAILY LIVING AFTER ACUTE MYOCARDIAL INFARCTION

June Wong

Cardiac Patients and Vocational Status

Resumption of work after coronary surgery is generally after 8 to 12 weeks whereas after MI 4 to 8 weeks and after coronary angioplasty 1 to 3 weeks. [6] Most studies indicate that approximately 15-20% of previously employed patients do not return to work after MI or CABG [2]. Furthermore, some of the patients who initially resume work do not remain employed long term. The reasons for occupational disability after a cardiac event are complex and involve with medical and nonmedical factors.

Loss of employment:

- increase the financial stress on the family
- negative impact on patient's sense of self worth and purpose of life

therefore, we need to determine which patients:

- can medically resume work
- need to find less demanding work
- need disability compensation

Assessment of the Patient's Potential to Return to Work

- should be initiated early in the patient's recovery process to help allay patient and family anxiety. i.e. during in-patient phase after patient's condition has been stabilized. includes:
    - clinical evaluation
    - job analysis
    - evaluation of emotional status and perceived psychological stresses
    - financial concerns
    - response to early ambulation and predischarge exercise testing
- give a fairly objective outlook regarding their probability of returning to work after an appropriate period of convalescence has passed
- use to recommend specific rehabilitation procedures

Clinical Assessment

- ongoing process
- patient's cardiac function and associated cardiac complications should be evaluated along with other medical problems:

a. medical history
b. physical examination

d. chest X-ray
e. graded exercise testing

further diagnostic workup such as arrhythmia monitoring, coronary angiography, appropriate medical or surgical therapy may be required to improvesymptomatology before the patient is able to resume work

Job Analysis

1. physiologic and psychological demands of the patient's occupation

2. patient's perceptions and concerns

3. type of work

a. dynamic
heavy dynamic work - produces a volume load
b. static
heavy static work - produces a pressure load [11]

Higher percentage of blue collar workers who fail to return to work or who return to work after a longer period of convalescence when compared with white collar worker [2,8]

Energy Requirements

- compared with the patient's measured physical work tolerance. (see table in Appendix I)
- actual energy cost of work varies with
  - the rate of work
  - the efficiency and size of the worker
  - orthopedic disabilities
  - degree of automation available in the job [13]

Work Related Factors:

Temperature Stress:

- environment is humid → ↑cutaneous blood flow for dissipation body heat → ↑myocardial oxygen requirement [12]
- ork performed in a cold environment: energy requirement of the work ↑ →
↑ in myocardial oxygen demand brought on by a rise in peripheral vascular constriction → myocardial ischemia at a lower level of effort

Psychological Stress:

- excessive or prolonged psychological stress may increase cardiac risk
- consider job stress and the patients' perceptions concerns regarding their ability to cope with the physical and emotional demands of their work.

Exercise Testing

- helps to develop realistic occupational and nonoccupational activity recommendations for cardiac patients
- helps to reassure the physician, patient, patient's family and employer about the patient's ability to resume work within a reasonable level of stress.

I. *Graded Dynamic Exercise Testing*

1. To determine patient's maximal oxygen consumption (VO2max)

- compare patient's physical work tolerance with oxygen demands of the patient's job
- average oxygen demand over an eight-hour working day should not exceed 40% of the patient's VO2 max [1]

2. To identify and separate patients into high-risk and low-risk subgroups

low risk: return to work without unnecessary delays and without extensive diagnostic evaluation
high risk: require more extensive diagnostic evaluation and exercise conditioning program

Patients who received a treadmill test and explicit instructions about the results, prognosis, and timing of return, actually returned to work at a median of 51 days compared to 75 days in patients receiving usual care. [10]

II. Simulated Work Testing

- for some occupations requiring arm work, heavy weight lifting, work combined with temperature stress, and intermittent heavy work tasks. Also individuals may work under conditions of psychological stress, such as time pressure.
- have the individual perform a specified task using the actual tools and equipment at a workstation setup

Benefits:

- provides more objective data
- patient and patient's family often gain confidence in the patient's ability to return to work safely through satisfactory performance [14]
- the Baltimore Therapeutic Equipment (BTE) [15]
- the Lido Workset

Rehabilitation Program and Work Resumption

- to help patient successfully return to work after a cardiac event by improving their physical work tolerance
- increase aerobic capacity through exercise conditioning

Simulated Work Program

Example of a graded simulated work program was developed by the Cardiac Rehabilitation Unit at Caulfield Hospital (Appendix II) and Western Hospital (Appendix III) in Melbourne.

- has a training effect that occurs through participation
- start at a level of energy expenditure which places demands on cardiac output, but is safe for that person.
- the intensity and / or duration of the activity may then be increased up to a level comparative to that individual's work demands. [3]

Problems in Hong Kong

- people may find it difficult to attend a program in work time
- if program is offered out of work hours, they may be too tired or have other commitments
- people be the breadwinner of the family and unwilling to join any program even medical certificate is offered to cover the duration of program due to financial difficulties

Advice On Activities Of Daily Living

Activity will play an important part in patient's life not only during the recovery but for the rest of life. All physical activity should be increased gradually. There are four key issues to advise the patient:

1. Not to over - exert themselves
2. To rest between activities

3. To discuss the activity program with their family to prevent over-protectiveness
4. To use common sense and set realistic goals [4]

General Precaution

1. Avoid Exercise After Meals
- wait an hour or two before exerting yourself after a meal
- digesting a meal is added work of the heart

2. Avoid Temperature Extremes
- heart works harder to maintain body temperature at temperature extreme
- avoid saunas, hot tubs and excessively hot showers as these will increase heart rate and blood pressure, particularly important where patients are hypertensive, taking vasodilators or anticoagulants

3. *Avoid Isometric Activity*
- e.g. straining during bowel movement
  weight lifting
  carrying heavy groceries
  loosening stuck jar lids

Avoid rushing, standing for long periods and excessive effort.

The day's activities should be approached as simply and calmly as possible
Avoid prolonged periods of activity.
Short periods of activity with frequent rest intervals are more energy efficient

Energy Conservation

Energy conservation is aimed at
- achieving more with less effort;
- reducing the energy requirements of daily activities; and
- avoiding over-fatigue and over-exertion

It involves:
- a pattern of rest / activity / rest
- the use of relaxation techniques
- work simplification
- good body mechanics

Occupational Therapist may prescribe the use of adapted equipment or suggest some home alterations / modification to assist patient to conserve energy.

1. Rest
- emphases on a balance of activity and rest, with short rest periods during the day.
- resting for 10-15 minutes between every hour of activity is much better than one hour of rest at the end of four hours of work.
- relaxation training if indicated

2. Principles of Work Simplification
(General principles can be applied to all tasks)

a. Mental outlook (be flexible)
- be prepared to change the routine and methods of working
- let other family members / housemates do some of the chores
- leave tasks that are too demanding for someone else or for another time
- respect fatigue and pain (never work beyond the point of pain)

b. Work Planning and Organization
- organize the time and tasks
- daily tasks, weekly tasks, infrequent tasks
- outside interests and leisure time

Plan work areas (avoid unnecessary bending, reaching, stretching, carrying)

- keep equipment at the place where it is used and duplicate materials to eliminate need for
carrying these between areas (e.g. cleansers)

- keep most often used equipment in most accessible place
- have good storage system (e.g. lazy susan, pegboard)
- if possible, work areas (e.g. bench, sink, stove) should be of similar
height and continuous (allows for sliding rather than lifting objects)

c. Work Methods

- divide a long activity into SHORTER stages
- alternate LIGHT and HEAVY activities
- alternate ALL activities with rest
- working at a MODERATE pace uses the least energy
- avoid strain by:
    - •using a trolley (to move heavy / many items)
    - •using aids (e.g. tap turner, electrical appliances)
    - • sliding rather than carrying

d. Good Body Mechanics

Our body uses energy even at rest. One should learn to use muscles in an efficient way and to use the strongest muscles for the job.
- sit to work whenever possible (e.g. ironing)
- use good posture
    - •sitting: good back support, foot stool
    - • standing: feet apart, back straight
- change position (alternate sitting with standing, shift weight to use different sets of muscles)
- use proper lifting techniques
    - • bend the knees instead of the back
    - • carry objects close to the body
- make full use of chair to support body in sitting

3. *Application of the Principles*

(Some specific examples only)

I. Personal Activities of Daily Living

Hygiene

-ensure all required items are present
-use a non - slip mat (reduces stress and muscular tension when moving into / out of shower / bath)
-sit to shower or bath and to dry self
-electric toothbrush for teeth

Dressing

- sit where possible
- select clothes that are easy to dress in
- dress as much as is possible prior to moving

Grooming

- sit in front of a comfortable height, well-lit mirror when grooming
- keep a permanent set of equipment at the mirror and carry a separate set of these items when out of home

Eating

- use sharp utensils, comfortable height chair and table, double-handled mugs, and other aids recommended by the Occupational Therapist to decrease the effort involved in tasks

II. Domestic Activities of Daily Living

Cooking

- select recipes emphasizing simple preparation and involving few utensils
- collect all ingredients first on work bench on one side of work area
- sit while preparing food
- use sharp utensils or electric utensils (can-openers, food blender)
- stabilize mixing bowl on non-slip mats

Shopping
- prepare a shopping list before shopping
- shop with a relative or friend to share the carrying

Dishwashing
- choose strong detergents and effective scrubbing brush
- allow dishes to soak if difficult to clean
- allow dishes to drain dry

Laundry
- do little amount more frequently
- have the clothesline or clothes drier at a comfortable height for loading (around chest to shoulder height is best)
- do not iron non-essentials, using a "steam and dry" iron eliminate the need for 'damping' clothes

Cleaning
-clean less often (once a week instead of every day)
-have the cleaning liquids and equipment nearby to where they are used
-extra strength cleaners reduce effort required in cleaning

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STRESS MANAGEMENT AND RELAXATION TRAINING IN CARDIAC REHABILITATION

Leonard Li

Stress management and relaxation training is one of the components in most cardiac rehabilitation programmes. Cardiac patients face stress during their acute, rehabilitative stages of illness as well as their daily life.

Emotional Reactions of Cardiac Rehabilitation Patients

Their emotional reactions are similar to those faced by other rehabilitation patients

- depression
- frustration
- anger

in response to

- having to adjust to limitation
- learn new habits
- change self-concepts
- cope with physical discomfort and pain
- overcome feelings of helplessness

Fears and anxieties tend to be focused on a sense of vulnerability on threat from the disease. They are different from other rehabilitation patients in that cardiac disease carries the risk of a sudden and dramatic death that seemingly can strike without warning. Uncertainties about the safe limits of physical activity or emotional arousal are common expressions of this sense of vulnerability. 15 - 30% depressed patients

will remain depressed and anxious 6 - 12 months following the infract. Those at risk are with premorbid personality of depressive tendencies, hypochondriasis and chronic dissatisfaction.

Stress in Daily Life

Stress can appear in different aspects of life

- finance
- family
- marriage
- work
- environment, etc.

Those with financial problems, marital and job discord and inability to cope with stress will delay or prevent a successful rehabilitation outcome. Social isolation and job stress was associated with an increased risk of death in men who survived a myocardial infraction.

Evaluation

1. Identication of stressors in different aspects of life

2. Identication of hobby or lesiure interest

3. Assessment of level of stress / anxiety and depression score/ quality of life in the form of questionaires.

4. Premorbid personality evaluation

Management

1. Education Programmes

Group education in pathophysiology of cardiac diseases, interventional procedures and dietary advice will enhance patients understanding of their own illness and alleuviate their fear of uncertainties.

2. Graded Exercise Programmes

Exercise is not only for physical training, but also have an important role in psychological therapy. This will help patients to build up their confidence in activities and understanding their own extent of physical capability.

3. Individual Counseling

Individual counseling for those who are identified to have financial, marital or vocational problems.

4. Group Counseling.

5. Relaxation Training.

6. Referral

Referral to psychologist for individual counseling if disruption in multiple life spheres.

Relaxation Training

1. Relaxation exercise

2. Yoga

3. Meditation

4. Biofeedback

NUTRITION AND CVD

Selina Khor

Diet is known to play an important role in the development of many diseases. However it is often just one of the several factors which influence the development of disease in susceptible individuals and this is so for coronary artery disease. Diet can have a significant effect on blood cholesterol level in some people (including levels of LDL and HDL cholesterol) and raised levels of circulating cholesterol can contribute to the development of atherosclerosis. In addition the clotting ability of the blood is partly under dietary control.

Food purchase, preparation and consumption forms a considerable part of ordinary daily living as well as of special occasions and it is important that this is pleasurable and not restrictive. Eating a healthy diet can achieve a positive rather than a negative outlook. It is the balance of food intake over a period of time which is important and foods themselves should not be classed as "good" or" bad.

National Cholesterol Education Program (NCEP) of US recommends Step 1 and Step 2 diet for dietary intervention for hypercholesterolaemia (please refer to the lecture outline by Dr Albert Leung Wai-suen). The Department of Health and Social Security's Committee on Medical Aspects of Food Policy, 1991 published the recommendations in 1991. The dietary recommendations are aimed at reducing the incidence of diet -related diseases, including coronary artery disease and form the basis of dietary change for prevention of disease and a pattern of 'healthy living'. The advice relates mainly to the intake of fat, sugar and salt and more fibre. The dietary changes extend beyond the popular ideas of limiting the intake of animal fats to include an increase in dietary fruit, vegetables and wholegrain cereals to provide fibre, vegetable protein and complex carbohydrates which also play a role in altering the profile favorably.

The Recommendations are Summarized Below :

- Correct overweight or obesity.
- Decrease total fat, especially saturated fats. This change will reduce energy intake. An increase in the ratio of polyunsaturated to saturated fats may be beneficial.
- Reduce animal protein consumption and increase that of vegetable protein, particularly legumes (peas, beans and lentils).
- Include oily fish regularly, e.g. mackeral, herring.

Avoid 'simple' sugars but increase the intake of fibre-rich complex carbohydrate-rich foods, e.g. fruit, vegetables, wholegrain, cereals.

Dietary Fat

Fat is a concentrated source of calories and forms the body's main store of energy. An exercise intake of fat tends to

obesity and a diet rich in fat, particularly 'saturated' fat, used by the liver to make cholesterol, plays a part in the development of coronary artery disease. Saturated fats are hard or solid at room temperature and are found mainly in foods of animal origin - meat, dairy products such as milk, butter and cheese and most margarine.

Unsaturated fats, which include polyunsaturated fats, are mainly liquid fats or oils at room temperature and are found mainly in foods of plant or fish origin, such as sunflower. safflower, soya and corn oils and fish oils, salmon, tuna, herring, mackeral, pilchards and trout. Oilve oil is especially high in monounsaturated fat. There are some exceptions to the general rule, for example chicken, turkey and rabbit contain fats which are less saturated than most animal fats, while palm and coconut oil are very high in saturated fats.

The reduction in fat intake and the change from saturated to polyunsaturated fats can be brought about by :

- Eating only lean meat, removing all visible fat and the skin from poultry.
- Eating plenty of oily fish.
- Using lower fat alternatives where available, for example skimmed or semi-skimmed milk and low-fat cheeses, and replacing butter with a margarine high in polyunsaturated.
- Avoid fried food, use steaming, braising, grilling, boiling methods. Use of non-stick pan for shallow frying.
- Reducing the intake of chocolates, cakes, biscuits, pastries and potato crisps and chips.

Some foods, including meat and dairy products, contain cholesterol itself, and others such as egg yolks, offal (e.g. liver, kidney), shellfish and fish roe are concentrated sources. These foods can also be limited.

Dietary Fibre

Dietary fibre is found in the cell walls of plants - leaves, fruits, flowers, seeds and roots. A high intake of fibre, particularly ' soluble fibre', is associated with a reduction of blood cholesterol levels.

Increase fibre intake can be achieved by an increase intake of any of the following foods:

- Wholegrain cereals such as wholemeal bread, wholegrain rice, fruit and vegetables including pulses such as peas, beans.

Sugar Intake

To develop a pattern of healthy eatng, intake of sugars should be limited whilst polysaccharides which starch, and the roughage constituents cellulose and pectin, found in foods of plant origin, are to be encouraged at the expense of fats. An increase in the intake of complex carbohydrate foods such as rice, bread, noodle is important to maintain an adequate energy intake to offset the calories no longer obtained from fat in those who do not need to lose weight.

Sugar is solely a source of calories, but has no other nutritional value and all carbohydrate which is not required by the body for immediately use is stored as fat and contributes to the development of obesity.

Salt Intake

As with sugar and fat, we all eat much more salt than we need and in suscepectible individuals this may be associated with a raised blood pressure.

Salt intake can be reduced by adding little salt during cooking and using flavourings such as lemon juice, spices, herbs to help improve the taste of food. Cut down the seasoned and preserved vegetables and foods such as salted fish, salted eggs and preserved vegetables.

Practical Guidelines For Adjusting The Diet To Follow The Currently Accepted Nutritional Recommendations

Eat LESS fat and change the balance of fat intake

- Remove all visible fat from meat and skin from poetry and eat smaller portions.
- Eat plenty of fish, some poultry and occasional lean red meat.
- Use lower-fat alternatives where these are available, .e.g. of milk and cheese.
- Use a margarine of spread that is high in polyunsaturateds
- Use minimal amounts of a suitable oil in cooking

Reduce the intake of foods with 'hidden' fat, e.g. chocolate, cakes, biscuits, pastries, chiips and crisps.

Eat MORE fibre but make this increase gradually

- Use wholegrain rice instead of polished rice.
- Use a lot of vegetables as complement to meat dish.
- Eat plenty of fruit and vegetables.
- Drink adequately fluid.

Eat LESS sugar

- Drink unsweetened tea, coffee, fruit juice or low calore solft drinks.
- Use fresh fruit rather than swetened fruit drinks.
- Reduce the intake of foods with 'hidden' sugar, e,g, sweets, chocolates, cakes, biscuits and puddings.
- Use less sugar n cooking.

Eat LESS salt

- Use less salt in cooking and avoid the use of preserved foods such as preserved vegetables, bacon, Chinese preserved sausages.
- Reduce the intake of salty snacks such as crisps and nuts.

Diet And The Prevention Of Heart Disease

There are three categories of prevention, primary, secondary and tertiary.

1. Primary Prevention

It is aimed at healthy people in an effort to promote health and prevent disease occurring. Programme aimed at changing lifestyle practices, a change in behaviour not merely a change in knowledge in order to prevent CHD.

2. Secondary Prevention

it is concerned with the early detection of illness and the prevention of a further deterioration in health or restoration

to a former state of good health.. Secondary nutrition education must be very positive and practical in nature. It is vitally important that all the nutrition advice is consistent and therefore dietitians should communicate regularly with the health care team. Most patients who have been diagnosed as having angina, nor have been found to be "at risk" of CHD, will need more than one consultation with a dietitian to achieve a reduced serum cholesterol, reduced weight or blood pressure.

3. Tertiary Prevention

This is targeted at individuals who have a distinct disease, and aims to help rehabilitate individuals and help them to maximize their quality of life. Many individual s who have had a heart attack will need counseling and support to enable them to return to an active and productive lifestyle. The dietitian should be a member of the rehabilitation team and should provide practically-oriented nutritional advice and support.

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DIABETES LIFESTYLE MANAGEMENT

Maggie Siu & Yuen Yung Kwong

Diabetes Mellitus

Diabetes is a systemic chronic incurable disease characterized by hyperglycaemia. It is a disorder of metabolism that involves many physiologic systems other than glucose metabolism.**5** It is caused by a decrease in secretion or activity of insulin. High blood glucose will acts on body by attaching itself to different protein molecules throughout the body causing damage to the small and large blood vessels which contributes to development of long-term complications e.g. hypertension, cardiovascular diseases, C.V.A., retinopathy, neuropathy, nephropathy, skin infection and foot problems.

Diabetes is universal, with widely varying prevalence rates in different populations and within the same population.**1** With the progress of the diabetes, the risk of developing complications will increase which will increase the morbidity and mortality rate, thus accentuated the public health burden and affect patient's quality of life. In fact, the development of diabetes complication can be minimized. The maintenance of blood sugar levels as close to normal as possible at all times is the key to minimizing and/or preventing retinal and renal failure and will also be beneficial to avoid neuropathy.**5**

Lifestyle Management

In order to achieve an optimal glycaemic control, life-style modification and patient's consistent co-operation are necessary. The aims of treatment is the relief of hyperglycaemic symptoms e.g. polyuria, polydipsia, easy fatiquibility and nocturia, and the avoidance of hypoglycaemia and ketoacidosis. Besides, another goal of treatment is the reduction or delay the occurrence of long term complications, thus enabling the diabetes to live a life as close to "normal" as possible. Therefore, the patient has to make some changes and there are several important aspects related to his/her daily life that that he/she must know.

A. Adherence to the treatment principles

1. Dietary Control

In a diabetes, the ability of the body to use, store, and retrieve the fuels from food is impaired. The principles of dietary control is to control the blood sugar and cholesterol level and provide adequate nutrition to the body and will facilitate the achievement of an ideal body weight. The guidelines are:

- eat a variety of foods.
- avoidance of simple sugar

- avoidance of fatty food and food with high level of saturated fat and cholesterol
- adequate carbohydrates and high fibrous food
- avoid food with high salt, especially the processed and fast foods
- small and frequent eating i.e. take snacks in-between 3 main meals
- keeping of regular meal and snack time

The purpose of a diabetic eating plan is to be a part of treatment. In fact, the eating plan is individualized, especially in patient with cardiac disease, according to patient's age, exercise level, body weight and preference. Therefore, it is important that each diabetic patient should consult a dietitian to develop an eating habits that are part of daily life-style - permanent habit that the diabetes can live with.**3**

2. Oral Hypoglycaemic Agents (O.H.A.)

Treatment with OHA is considered in patient with high blood glucose level at diagnosis, while in patient with dietary control initially will consider the commencement of OHA when a period of diet and exercise therapy fail to improve glycaemic control. There are mainly 2 groups of OHA:

2.1. Sulphonylureas

Action - It stimulates the beta cells of the pancreas to secrete insulin and may improve insulin sensitivity on a long term basis.2

Side-effects - skin rash, bowel upsets and hypoglycaemia

Special notes - should be taken 15-30 minutes before meal for optimal effects Examples Daonil, Diamicron, Minidiab and Tolbutamide, Biguanides.

Action - enhances insulin action and improves insulin sensitivity and will reduces peripheral glucose production by inhibiting glycogenolysis and gluconeogenesis and to reduces glucose absorption

Side-effects- gastrointestinal upset like diarrhoea and nausea

Special note - avoid use of it in patients with significant liver, kidney

-or cardiac diseases and alcoholism due to increased risk of lactic acidosis in these patients..

Example: Metformin

Patients on OHA must follow doctor's prescription and should not alter the drug dosage without doctor's instruction.

3. Insulin Therapy

It is the direct supply of extrogenous insulin to the body through subcutaneous injection. It is necessary in all patients with insulin dependent diabetes mellitus (IDDM) and those patient with secondary OHA failure. Insulin therapy is individualized and must be administered according to doctor's instructions.

The patient who is on insulin must have the knowledge on causes, sign and symptoms, management and preventive precautions of hypoglycaemia.

4. Exercise

Exercise is probably the earliest form of treatment of diabetes; although it was not always recognized as a form of therapy.

4.1. The advantages of exercise are:

4.1.1. reduces the risk of vascular problems e.g. heart disease, and peripheral vascular disease

4.1.2. sustained endurance exercise decrease blood lipid, cholesterol and blood pressure

4.1.3. promote circulation and strengthening the heart

4.1.4. regular exercise helps to reduce weight and improves insulin sensitivity independent of weight reduction

4.1.5. lowering of blood glucose level during exercise

4.2 Special issues :

Despite of the advantages of performing exercises, there are several important issues that need to notice, especially in patient with cardiac disease:

4 2.1. ensure physical fitness and search for vascular, neurological and retinal complications before advising strenuous exercise; while those patients who got cardiac disease should have their cardiovascular system thoroughly assessed before designing an exercise programme

4.2.2. diabetes patient with cardiac problem should discuss with the cardiologist on the exercise programme. Exercise programs should be individualized with warm-up exercise and gradual increase of intensity

4.2.3. advise patient to choose the exercise which can be performed regularly, if not possible, an increase of daily activity in the form of walking or climbing stairs can be recommended.**2**

4.3. Special precautions:

Foot care:

Injury or other lesions on the feet are great potential danger in a diabetic patient because of the high risk of infection due to the possible slow wound healing process and poor circulation in the feet. Therefore, those who plan to perform regular exercise or increase their regular physical activity have to take special care to avoid causing injury to their feet :wear broad-headed, with thick base and light shoes, e.g. sports shoes.wear socks whenever wearing shoes

- inspect the feet regularly for any "unawared" injury (because of poor sensation)
- apply lubricant when weather is dry and for patient whose feet are dry
- consult chiropodist when foot

4.3.1. Monitoring

Patient can check his/her H'stix (blood glucose) before and after exercise to check on the effect of exercise on his/her glycaemic control. Besides, the detection of such effect will facilitate patient's self adjustment like taking of extra carbohydrate before exercise or adjusting the insulin dosage (for those who is on insulin therapy) after discussing with the health professionals, or the avoidance of exercise when the H'stix is high (above 15 mmol/l).

4.3.2. Aware of hypoglycaemia

The patient should bring along a card stating his/her medical condition, especially the DM and cardiac problem. Also, the carrying of some candies is necessary which is essential for immediate management of a hypoglycaemic attack. Moreover, the patient should bring with him/her some biscuits or bread when going out for exercise.

B. Obtaining knowledge about D M

Besides the above principles, learning of the knowledge concerning DM is actually an important strategy to facilitate the achievement of all other treatment principles.*Diabeteseducation* is essential because:

1. it equips patient with the basic self-care hints and how to live their diabetes, thus assisting them to reach 'health and freedom' **3**
2. knowledge and understanding will enhance good and consistent compliance, thus achieving a good glycaemic control
3. potential diabetes complications contribute to high morbidity and increased mortality rate which actually can be minimized or delayed (D.C.C.T. Report, 1993)
4. education provides knowledge concerning diabetes management and advice on daily diabetes care
5. having a stable and good glycaemic control, patient will

- has less chance to be hospitalized
- has fewer days of illness and complication
- be able to function and cope with the rigors of modern life
- maintain his/her usual and productive life
- less costly to oneself, one's family and the community

It is advisable that all diabetic patients should receive diabetes education and their relatives are encouraged to attend the education session together with patient. The diabetes nurse provides the diabetic patient with the knowledge on:

- pathophysiology of DM, treatment principles, DM complications, home monitoring, exercise, injection
- technique hypoglycaemia and hyper-glycaemia, sick days management, foot care, diabetes and pregnancy, traveling rules and etc.

In Hong Kong, diabetes care and education service is available in most of the regional hospitals and the patients can be referred by nurses, doctors, community nurse or other health professionals.

C. Keeping of Regular Home Monitoring

In order to assess how effective is the treatment, beside attending regular medical follow-up, continuous home urine/blood glucose monitoring is important. The results can reflect the patient's current glycaemic control which will enhance proper adjustment of HO or insulin and the treatment regime. Besides, it is a form of self-education which provides direct feedback to the patients regarding factors that may affect glycaemic control.**2**

1. Urine sugar monitoring

1.1. an indirect reflection of one's blood sugar level

1.2. not as accurate as blood sugar monitoring

1.3. it is simple and cheap
cannot distinguish between hypoglycemia, normoglycaemia and hyperglycaemia not recommended for patient with high/low renal threshold pro-bably acceptable only in elderly patients with stable diabetes or in those who refuse/fear of fingering or cannot afford self blood glucose monitoring (SBGM) recom-mended frequency:

- times/day ; 2 hours after 3 main meals

- for patient with good control, i.e. always having negative results, can test this 2 to 3 days a week

2. Blood glucose monitoring (SBGM)

2.1. direct reflection of one's blood sugar level
2.2. can detect hypoglycaemia and hyperglycaemia
2.3. important and essential in patients on insulin therapy for accurate insulin dosage adjustment
2.4. provide direct feedback regarding lifestyle factors (diet, exercise) which affect blood glucose levels
2.5. preferred by most patients
2.6. recommended frequency:

- for patient not having insulin, can check it at any time, like before 3 main meals or 2 hours after meal
- for patient on insulin, best check before 3 main meals, before bed and check 2 hours after meal when the pre-meal blood glucose levels are satisfactory
- should increase frequency of testing during sick days

The types of monitoring and the frequency of monitoring should be individualized, depending on patient's condition, his/her need and how much he/she can afford. Detail advice can be given by doctors or diabetes nurse.

D. Awareness and Prevention of Hypoglycaemia

Hypoglycaemia is the commonest acute complication in which the blood glucose level is low, at a level less than about 3.0 - 3.5 mmol/l. It is important that the patient understand the causes , signs and symptoms, and preventive measures of hypoglycaemic attack since this can mostly be prevented and the remedial measure is very simple.

Hypoglycaemic attack usually occurs suddenly with the symptoms appear quite rapidly, over 10-15 minutes. The classic "warning" symptoms are sweating, tremor, palpitation, hunger, paraoral paraesthia and feeling of anxiety and unease. The level of symptoms varies with each person.

1. Classification
1.1. Asymptomatic (biochemical) : < 2.8 mmol/l
1.2. Mild- moderate symptomatic : able to recognized and self-treat hypoglycaemia
1.3. Severe: temporarily disabling and requiring assistance
2. Causes
2.1. Over-treatment with insulin or oral hypoglycaemic agents (O.H.A)
2.2. Insufficient carbohydrate intake, delay meal time or inappropriate timing for food taking after injection or taking of O.H.A.
2.3. Increased glucose consumption e.g. exercise
2.4. Decreased endogenous glucose production e.g. alcohol
2.5. Decreased insulin clearance e.g. renal failure

3. Preventive measures

The avoidance of the causes can help to prevent or minimize (since some hypoglycaemic attack has no special cause) the occurrence of hypoglycaemia.

4. Treatment

4.1. Taking of simple sugar which can raise the blood sugar to the normal

4.2. level within a short period of time e.g. 2 to 4 teaspoonful of sugar / 2 to
4.3. 4 sugar cubes/ 100 ml of juice or coke
4.4. After taking of simple sugar should follow by long-acting carbohydrate food e.g.bread, biscuits or go to take food right away when it is meal time.
4.5. In a severe hypoglycaemic attack, the patient may presents with drowsiness, confusion, even convulsion or unconsciousness. In this situation, the injection of glucagon ,1 international unit, by a trained relative will be necessary or may send the patient to the hospital immediately

5 Special Precautions

All diabetes patients should carry an identification card stating his/her diagnosis, the type of drug (if any) treatment is receiving and the actions to be taken during a hypoglycaemic attack. Also, he/she may carry a "Medic Alert" bracelet or necklace stating the diagnosis. Moreover, he/she should always carry some rapidly absorbable glucose (candies, Glucotab) and carbohydrate food (biscuits, bread) when going out.

E. Attending Regular Follow-up

In fact, the management and care of a diabetic patient need the team effort of differenthealth professionals, including the diabetes nurse, doctor, dietitian, chiropodist, community nurse and the medical social worker. It is important for the diabetic patient to attend follow-up by different team members so that appropriate adjustment of treatment and prompt referral can be made whenever necessary. Besides regular medical follow-up, patient should be arranged to attend the annual diabetic complication screening which is available in most of the Diabetes Centres of the main hospitals.

F. Adoption of healthy lifestyle

The following guidelines are important for a diabetic patient to follow in order to achieve a "normal" and "healthy" life together with his/her DM:

1. Maintain an ideal body weight
2. Don't eat fat
3. Small and frequent meal
4. Keep regular exercise
5. Quit smoking for life
6. Drink alcohol with wise (i.e. according to doctor's, nurse's or dietitian's instructions)
7. Management of stress, caused by both the diabetes and the life

G. Maintain an Active Life

Joining of the support groups organized for and by diabetic patients can widen the diabetic patient's scope of life. This will facilitate the achievement of a good glycaemic control by mutual support and encouragement through different activities, experience sharing and learning from others. One of the biggest groups in Hong Kong is the Diabetes Mutual Aid Society of Hong Kong (HKDMAS). Besides, in some individual hospital, diabetic patient support group has also been set which cater mainly the patients follow-up at their hospital or specialist O.P.D,.

To conclude, in patients with diabetes, they can enjoy a "normal" life if they are willing to co-operate and to modify their lifestyle. Also, it is important for them

to adopt a positive and optimistic attitude towards the disease. Finally, the best way of living with diabetes is to live a healthy lifestyle which benefits not only the patient, his/her relatives, but also the society.

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PSYCHOSOCIAL PROBLEMS AFTER MYOCARDIAL INFARCTION AND FACILITATING PSYCHOSOCIAL RECOVERY

Lai Yung & Yuk Yee Lam

Heart attack, a sudden and traumatic illness, which not only drives a man to the brink of death, but also plunges the survivor to a new world full of uncertainty. People are usually not equipped in dealing with heart attacks. Common psychological responses to this sudden crisis include shock, denial, anxiety, fear and depression. These can persist for months or even years. Appropriate psychosocial intervention can facilitate recovery in both physical and psychological health and help the patients in readjustment to normal life.

Psychosocial Problems of AMI Patients

1. Shock and Denial

" Why me ? " , " Where does it come from? Why do I have it?" " What is going to happen to me?"These are all questions patients normally ask. To them, heart attack ` reflects a breakdown of health, which they never think it would happen to them. As a result, denial is their common response. Short-term denial may be an appropriate and natural psychological response to overwhelming stress. However, long-term denial in the forms of disregarding potentially fatal symptoms, refusal to take medication, continuous smoking or ignoring advice about appropriate exercise level[1] , would certainly affect the process of rehabilitation.

2. Anger

The existence of the heart disease disrupts the plan and defeats the desire of the patients. That complicated feelings of frustration, worry and hostility will lead to anger towards oneself as well as others.

Myocardial Infarction can bring a series of losses and threats to the patients,e.g. loss of job, loss of control to one'sown life, threat of dying, threat of declining performance in job, etc. It also implies a change in role - from an independent healthy person capable of a living and taking charge of own self, to a patient depending on others. Therefore it is not surprising to see a patient, who faces so many losses and threats all in a sudden, expresses anger and hatred to one's own self as well as others.

Cardiac patients cannot get away from medical treatment for their rest of their lives. Therefore, they would like to grasp more information on their own health conditions. However, their request can seldom be entertained due to heavy

workload and long queue of medical instituations. The brief consultation and follow-up and detached response of staff concerned often cannot satisfy their needs and lead to great disappointment and anger.

3. Anxiety and Fear

The possibility of heart attack cast shadow on the patients and bring them uncertainties about the future. They are in a constant state of uneasiness, discomfort , and helplessness. These feelings are usually expressed outwards as anxiety and fear.

Anxiety is a biopsychosocial phenomenon which appear in the state of shortness of breath, chest pain or palpitations. As these conditions resemble the symptoms of heart attack, they cause the patients to have further anxiety and fear and worsen their health in return.

Anxiety and fear can be caused by:

a. Unfamiliar hospital procedure, medical tests, medical terminology and jargons, intimate care by strangers, etc.

b. Uncertainties and worries : possible loss of job, inability to change job due to health problem, financial difficulty, fear of incapable of performing daily activities, fear of incurring burden towards the family, fear of being stigmatized as patients, fear of rejection by others, fear of separation, etc.

c. Continuing symptoms including chest pain and weakness, which generate fear of dying and second attack, fear of medication and possible side effect. etc..

4. Depression

. When a patient has an increasing feeling of anger towards inability to cope with own illness, he may turn the anger inwards toward one s self. This may lead to serious depression and withdrawl if there is no proper ventilation. Studies showed that the rehabilitation progress were far from satisfactory for those depressed patients .2

Signs of depression can be noticed physically. To name a few, nervous activity or agitation, such as wringing of the hands, restlessness, having difficulty remaining in one place, or remain less active on the other hand and reduction or increase appetite.

Facilitating Psychosocial Recovery

Perception of greater personal control over their body and the belief of power to influence their health and even to their life is crucial to the recovery of the patients. Dr. Cortis, the well known cardiologist remarks that disease is well within the power of the patient to control and that is not dependent only on high-tech medical soloution.

The Power Resource Model proposed by Miller (1992) illustrates the ways to help chronic patients. By strengthening their own power resources, with the help of health professionals, the patients can overcome their sense of powerlessness, and improve control over their illness, environment, as well as their own lives.

The power resources include motivation, knowledge, energy, positive self- concept, social support, physical strength and reserve, and belief system. The patients own unique coping strategies

would be utilized to build up these power resources.

1. Motivation

To develop the patient's sense of control over self and environment, motivation is important in maximizing potential, promoting social and work role and developing self-confidence through risk taking. Motivation is also needed to learn new skills and engage in therapies.

Strategies:

a. To provide assessment and job retraining for those patients who are out of work because of the illness, so that they can explore own aptitude, learn new earning skills and build up their self-confidence.

b. To work together with patients to develop realistic rehabilitation plan with achievable aim. It can help the patients to modify their life style, self-evaluate the progress and enhance his confidence in overcoming limitations, thus reinforcing their motivation for long-term maintenance.

c. To provide continuous reassurance, concern and positive regard to the patients, so as to strengthen their confidence and motivation.

2. Knowledge

Studies showed that patients who were informed and possessed accurate expectations about anticipated experience would exhibit less anxiety during stressful event (Johnson, 1972; 1973; Johnson, Morrissey, & Leventhal, 1973) The provision of knowledge enables the patients to feel more in control and help to alleviate the anxiety. This internal awareness provides the patients with the ability to detect and interpret own physical and psychological cues so as to appropriate actions to control sysptoms and maintain psychologic balance. (Miller 1982)

Strategies:

a. To discuss the health development with the patients and involve them in medical decision concerning their treatment

b. To provide necessary information and knowledge related to their illness and rehabilitation

3. Energy

Energy is the capacity of a system for doing work. (Ryden 1977) Frequent thoughts of inability in coping with daily demand defeat self confidence and contribute to powerlessness of the individual, thus shutting off energy sources within the patients themselves.

Actually, cardiac patients still have rich reservoirs of energy in their hearts and bodies that they have never used because they do not realize its existence. Unlock these potential energy sources help to give strength to the patients.

Strategies:

a. To facilitate the unlocking of energy within the patients through encouraging the patients to practise meditation., as meditation helps to concetrate and focus the energy and increase the power of a person.

4. Social Support

Social support, by fulfiling the needs for affililation and sharing from a close and rewarding relationship, also

helps to allevate the negative consequences of stress.

Social support has also been found to predict subsequent mortality of survivors from myocardial infarction, behavior change and the maintenance of Changes such as smoking cessation 3

Strategy:

a. To encourage the patients to join support group: By sharing common experience, mutual help and support, cardiac patients will feel less alone. They will learn from each other s experience and develop constructive actions towards better health.

b. To build up support system around the patients, e.g. family members, relatives, friends and neighours.

5. Positive Self-concept

According to Epstein 1973 stated that self-esteem is a crucial component of self-concept. Self-esteem is composed of ' self-confidence' and ' self-respect' (Nathaniel Brandel, author of Psychology of Self-esteem). Self-esteem does not confine only to appreciation of one s good points but also accepting own limitation and willing to work through it.

Strategies:

a. To promote positive self-talk and self-affirmation of the patients

b. To increase self-competence of the patients by encouraging them to review their performance and modification process.

c. To enhance self-confidence and self competence in self care of the patients

e. To encourage the patients to love one's own self and others unconditionally.

6. Belief

' Word which come from the heart enter the heart ' (Mosese Ibn Ezra).Heart attack may not be so negative as believed. Sometime a heart attack will be a positive experience e.g. bring a family together, reveal one's humanity. . It can give hope and energy to them. The presence of hope empower a patient to overcome the senses of helplessness and lack of control.

Strategy:

1. To encourage the patients to seek spiritual support

2. To facilitate the unlocking of energy within the patients through encouraging the patients to practise meditation., as meditation helps to concetrate and focus the energy and increase the power of a person.

3. To promote inter-personal relationship with family memebers, relatives, friends and neighbours.

4. To enhance self-control of the patients

7. Physical Strength

It refers to both to the individual's ability for optimal physical functioning and to physical reserve. Physical reserve is the ability of the body to maintain physical balance when confronted with threats or extra demands. (Miller, 1992)

Strategy:

a. To enhance self-care ability of the patients, e.g., equip the patients with knowledge and skills in observing signs

and symptoms of heart disease, taking blood measurement and pulses, resuscitation in emergency.

b. To enhance social support among the patients and people around them.

Conclusion

I would like to quote the following paragraph from *The Healing Heart* as my conclusion.

" For many years, deaths from heart attacks have outnumbered fatalities from all other diseases. That number is now on the decline and will, I believe, decline further with the full realization, not just by the profession but by the general public, that a comprehensive program of treatment involves both the full utilization of medical science and the full development of the human healing system The fact that the ***belief system*** *can be vital activator of the healing system as an open door to an auspicious future in medical research and practice. "*

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