中華人民共和國香港特別行政區政府總部衞生福利及食物局
Health, Welfare and Food Bureau
Government Secretariat, Government of the Hong Kong Special Administrative Region
The People's Republic of China

本函檔號 Our Ref.: CR 8/3921/03 Pt.2　　電話號碼 Tel. No.: 3150 8951
來函檔號 Your Ref.: CB1/F/1/10　　傳真號碼 Fax No.: 3150 8930

傳真函件：2869 6794

香港
花園道 3 號
花旗銀行大廈 3 樓
立法會秘書處
議會事務部 1
財務委員會秘書
(經辦人：薛鳳鳴女士)

薛女士：

二零一零年二月五日財務委員會會議
關於衞生及醫護服務研究基金的 FCR (2009-10)54 號文件

在財務委員會於二零一零年二月五日就上述議程事項舉行的會議上，委員要求當局就 FCR (2009-10)54 號文件所臚列獲衞生及醫護服務研究基金資助的研究項目提供進一步資料。

關於獲上述基金資助的研究項目所產生的影響力，我們已在本函*附件 A* 的資料摘要中闡述當局利用研究結果制訂相關醫護政策，以及公私營醫療界別的醫護專業人員應用相關臨牀實務的情況。

當局有既定機制將研究結果廣泛發布予相關官員、公私營界別的專業人員和專家，包括把研究摘要／報告上載到本局網頁及在醫學雜誌上發表。已完成項目的研究摘要載於本局網頁(http://www.fhb.gov.hk/grants)，而曾在《香港醫學雜誌》發表的研究摘要則載於*附件 B*。

謝謝你對此事的關注。委員如需要更多關於上述事宜的資料，請隨時與本函代行人聯絡。

食物及衞生局局長
(李富榮 李富榮 代行)

連附件

二零一零年三月三日

獲基金資助的項目

項目名稱	研究機構	開始年份	狀況	批核金額 (港元)	應用相關醫護政策和臨牀實務
公共衞生主題					
發展和評核以提示形式推動的行樓梯運動作為增加本港健康生活活動的介入措施	港大	2004	已完成	460,333	為制訂有關健康生活的公共衞生政策提供參考
評估太極及步行運動所消耗的能量及對心血管健康的影響	中大	2004	已完成	811,790	為制訂有關健康生活的公共衞生政策提供參考
香港夫婦的婚姻狀況滿意程度研究	港大	2004	已完成	193,968	為制訂有關健康生活的公共衞生政策提供參考
提供重性精神病及早介入服務的成效：病例對照研究	港大	2005	已完成	646,240	有助和為制訂有關精神健康和治療精神病患者的醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
採用特別設計的數學模型(state-transition Markov modelling)為香港華裔人士進行乳房 X 光造影檢查的成本效益分析	港大	2005	已完成	389,270	有助和為制訂有關檢查常見癌症的公共衛生及醫護服務政策提供參考
香港的冠心病趨勢剖析：開發用以制訂政策及規劃的模式	港大	2005	已完成	251,932	有助和為制訂有關管理慢性疾病的公共衛生及醫護服務政策提供參考
就有關超重及肥胖和其相關行為因素所進行的香港人口分組健康調查進行 3 年跟進研究	港大	2007	已完成	754,268	有助和為制訂有關管理慢性疾病的公共衛生及醫護服務政策提供參考
無煙政策對市民健康情況的影響	港大	2007	已完成	527,104	有助和為制訂有關控煙的公共衛生政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
香港人口的慢性痛症、疲勞和失眠的發病率	港大	2007	已完成	585,148	有助和為制訂有關管理慢性疾病的公共衞生及醫護服務政策提供參考
與體重超標相關的糖尿病在香港所造成目前及日後的經濟負擔	港大	2007	已完成	177,896	有助和為制訂有關管理慢性疾病的公共衞生及醫護服務政策提供參考
香港人的頸痛問題：有關頸痛後果及有關醫療服務使用情況的電話調查	理大	2007	已完成	246,750	為制訂有關管理慢性疾病的公共衞生及醫護服務政策提供參考
香港糖尿病患者的體能活動及抑鬱的普遍程度及其與依從自理的相互關係	中大	2007	已完成	330,000	有助和為制訂有關管理慢性疾病的公共衞生及醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額 (港元)	應用相關醫護政策和臨牀實務
香港動起來：鼓勵兒童多做運動的介入服務	港大	2007	已完成	473,220	有助制訂有關促進健康生活的公共衞生政策
飲食業從業員吸入二手煙的風險	港大	2007	已完成	711,082	有助和為制訂有關控煙的公共衞生政策提供參考
香港兒童肥胖的風險因素和結果的回顧性定羣研究	港大	2007	已完成	40,737	有助和為制訂有關健康生活的公共衞生政策提供參考
世界衞生組織於 2006 年制訂的嬰兒生長標準是否適用於香港的華裔嬰兒？全球適用的標準或流行病學之轉化性特定階段的標準	港大	2008	已完成	74,544	有助制訂有關兒童營養的公共衞生政策

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
有關中國傳統運動(太極)令認知能力輕微受損的病人維持認知能力和身體機能的成效的隨機對照試驗	中大	2007	仍在進行	620,400	有助和為制訂有關健康生活和高齡及長者護理的公共衞生政策提供參考
改善精神健康：職業康復為本港患精神分裂症的華裔病人提供的認知能力訓練	理大	2007	仍在進行	209,000	有助和為制訂就精神健康欠佳人士有關治療及融入社區的公共衞生政策提供參考
兒童在出生前接觸低劑量甲基汞對神經認知造成的長遠後果	中大	2007	仍在進行	607,700	有助制訂有關預防意外傷害和中毒的公共衞生政策
在特殊學校環境中為兒童而設的體能活動	港大	2007	仍在進行	425,035	有助和為制訂有關健康生活的公共衞生政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
為 0 至 18 個月大幼兒的家長舉辦家庭戒煙主動介入計劃：隨機對照試驗	港大	2007	仍在進行	523,478	有助和為制訂有關煙草使用及接觸二手煙的公共衛生政策提供參考
兒童患癌的存活者的健康情況調查	中大	2008	仍在進行	514,021	有助和為制訂有關醫療需要評估的公共衛生及醫護服務政策提供參考
釐定香港學前兒童的呼吸氣量參考標準	中大	2008	仍在進行	785,400	有助制訂有關推廣健康生活及管理慢性疾病的公共衛生政策
調查肥胖及脂肪激素與心血管系統疾病及癌症發病率的因果關係的人口趨勢研究	港大	2008	仍在進行	771,600	有助和為制訂有關管理慢性疾病的公共衛生及醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
適量飲用酒精飲品是否可預防患上心臟及呼吸系統疾病？	港大	2008	仍在進行	356,780#	有助和為制訂有關管理慢性疾病的公共衞生及醫護服務政策提供參考
市民對空氣污染風險及香港相關的環保行動觀感的決定因素	港大	2008	仍在進行	389,640	有助和為制訂有關管理慢性疾病的公共衞生及醫護服務政策提供參考
快速眼動期(REM)睡眠行為障礙與精神病學：隱性但有潛在危險的情況(病例對照研究)	中大	2009	仍在進行	616,951	為制訂有關精神健康及治療精神病的公共衞生政策提供參考
香港的非酒精性脂肪肝病及晚期肝纖維化症發病率：採用磁力共振分光術及肝臟纖維掃描儀進行橫剖性人口研究	中大	2009	仍在進行	716,728	有助和為制訂有關管理慢性疾病的公共衞生及醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
初生首 18 個月的喘鳴現象：室內二氧化氮水平、甲醛及哮喘病家族史因果關係的羣組趨勢研究	中大	2009	仍在進行	711,000	有助和為制訂有關預防意外傷害和中毒的公共衞生政策提供參考
幼兒或兒童肥胖會否引致青少年抑鬱問題？	港大	2009	仍在進行	261,379	有助和為制訂有關管理慢性疾病的公共衞生及醫護服務政策提供參考
幼兒及兒童成長與青少年的血壓	港大	2009	仍在進行	244,132	有助和為制訂有關管理慢性疾病的公共衞生及醫護服務政策提供參考
醫護服務方面					
在亞急性期的中風華裔病人的制約性誘發活動治療	律敦治醫院與鄧肇堅醫院	2004	已完成	88,588	有助和為提升有關管理中風的臨牀實務提供參考

項目名稱	研究機構	開始年份	狀況	批核金額 (港元)	應用相關醫護政策和臨牀實務
以心理教育介入處理兒科腫瘤病人出現與化療相關的噁心及嘔吐的成效：先導計劃	中大	2004	已完成	100,000	有助和為提升有關管理癌症的臨牀實務提供參考
提高接受外科手術的長者病人在手術全期的醫療成效：評估麻醉所使用的氣體混合物中的氧化亞氮	中大	2004	已完成	586,956	有助和為提升有關進行麻醉的臨牀實務提供參考
以跨專科護理的個案管理模式改善患有初期老人癡呆症長者的生活質素和減輕照顧者的負擔	中大	2004	已完成	554,800	有助和為制訂有關管理癡呆症的醫護服務政策提供參考
研究心理社會介入模式對改善患有結腸癌的華裔病人的生活質素及心理健康的成效的隨機對照試驗	港大	2004	已完成	354,010	有助和為提升有關管理癌症的臨牀實務提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
影響乳癌徵狀延遲呈現的因素	港大	2004	已完成	229,928	有助和為制訂有關早期診斷和檢查常見癌症的醫護服務政策提供參考
為香港華裔癌病兒童所提供與健康相關的改善生活質素措施	港大	2004	已完成	463,464	有助和為制訂有關管理癌症的醫護服務政策提供參考
評估一羣被虐華裔婦女接受增強能力介入服務的成效	港大	2004	已完成	545,094	有助制訂有關管理家庭暴力的醫護服務政策提供參考
生活品質調整後人年：量度人口的生活質量	港大	2004	已完成	783,600	有助和為制訂有關資源分配的醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
由香港的前線護士提供和評估防止自殺及管理計劃	中大	2004	已完成	519,345	有助和為制訂有關精神健康的醫護服務政策提供參考
評估在香港普通科門診診所的基層醫療環境下不同醫療服務提供模式的成效	中大	2004	已完成	699,644	有助和為制訂有關發展基層護理服務的醫護服務政策提供參考
華裔男長者的泌尿生殖問題和情緒失調：香港首個流行病學組羣研究	中大	2004	已完成	695,136	有助和為制訂有關醫療需要評估的醫護服務政策提供參考
翻譯並評核兩份以中文撰寫的冠心病病人與健康相關的生活質素的文件	中大	2004	已完成	393,846	有助和為制訂有關管理慢性疾病和資源分配的醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額 (港元)	應用相關醫護政策和臨牀實務
為長期病患者處方社區模式的運動的可行性及接受程度的先導研究	中大	2004	已完成	77,310	有助和為制訂有關管理慢性疾病和資源分配的醫護服務政策提供參考
針對為嚴重精神病患者而設的輔助就業及傳統職業康復進行為期 3 年的跟進研究	理大	2005	已完成	795,024	有助和為制訂有關精神健康和資源分配的公共衛生及醫護服務政策提供參考
以心象記憶法加強中風人士的工作類比能力	理大	2005	已完成	69,000#	有助和為制訂有關管理慢性疾病和資源分配的醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
對撕裂傷口使用多抹棒(Dermabond) (2－氰基丙烯酸辛基酯 2-Octyl cyanoacrylate)與縫合的成本效益進行隨機對照試驗	中大	2005	已完成	241,246	有助和為制訂有關急症服務之資源分配的醫護服務政策提供參考
患上發燒及中性血細胞減少症的癌症病人：香港風險評估工具及傳染性病源學的前瞻性評估	中大	2005	已完成	199,949#	有助和為提升有關管理癌症的臨牀實務提供參考
香港口腔衞生與口腔衞生服務提供的不平衡：現存數據的分析	港大	2005	已完成	186,629#	有助和為制訂有關牙齒健康之資源分配的醫護服務政策提供參考
本港華裔男士的產後抑鬱問題	中大	2005	已完成	794,529	有助和為制訂有關精神健康的醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
隨機對照臨牀試驗：靜觀減壓課程對長期痛症病人的痛症和生活質素的影響	中大	2005	已完成	399,000	有助和為制訂有關管理慢性疾病之資源分配的醫護服務政策提供參考
制訂以口咽食道炎症量度癌症病人的生活質素：以針對口咽食道炎症的指標量度接受癌症治療病人的生活質素	中大	2005	已完成	277,340	有助和為制訂有關管理癌症的醫護服務政策提供參考
本港華裔嬰兒組羣快速成長的中短期影響	港大	2005	已完成	579,418	有助和為制訂有關醫療需要評估的醫護服務政策提供參考
壓力包紮法對患有靜脈潰瘍的長者在傷口癒合方面的成效及心理社會上的影響：隨機對照試驗	中大	2007	已完成	618,648	有助和為提升有關管理慢性疾病的臨牀實務提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
人口老化與本港醫院服務的使用：回顧性組羣研究	中大	2007	已完成	494,555	有助和為制訂有關減少可避免住院的醫護服務政策提供參考
評估心臟衰竭患者的自理行為：兩項就心臟衰竭自理的評估方法的跨文化適用程度	中大	2007	已完成	79,380	有助和為制訂有關管理慢性疾病的醫護服務政策提供參考
利用方便樣本的研究方法制訂和評核建築環境對本港高齡人士步行的影響	港大	2007	已完成	356,849	有助和為改善病人護理及推廣健康生活提供參考
測試電話介入方式在改善受親密伴侶虐待的婦女的精神健康方面的成效的隨機對照試驗	港大	2007	已完成	655,560	有助和為改善精神病人護理提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
乳癌手術後的心理社會及生理影響：為期 5 至 6 年的跟進及探討就診因素	港大	2007	已完成	149,155	有助和為制訂有關管理癌症的醫護服務政策提供參考
香港小五至小六學生的飲食習慣，以及採用「兩分鐘評估」的快速飲食習慣問卷來衡量這組別的健康飲食行為的有效和可靠程度	中大	2008	已完成	64,250	有助和為制訂有關兒童營養的公共衛生及醫護服務政策提供參考
防止安老院舍長者認知能力衰退的護腦飲食餐的隨機對照試驗	中大	2008	已完成	568,000	有助和為制訂有關高齡及長者護理的公共衛生及醫護服務政策提供參考
患上嚴重精神病的華裔成年人的改變階段、自責和遵從治療的情況	理大	2007	仍在進行	465,090	有助和為制訂有關精神健康的公共衛生及醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
手術後出現幻覺和認知能力衰退的情況：採用麻醉管理以改善病人手術後的精神狀況的隨機對照試驗	中大	2007	仍在進行	696,520	有助和為改善精神病人護理提供參考
加壓沖洗能否有效取代以棉花球清潔傷口？	威爾斯親王醫院	2007	仍在進行	503,994	有助和為制訂有關急症服務和資源分配的醫護服務政策提供參考
接受治療癌症化療的癌病兒童出現口腔黏膜炎的原因和醫療成效	中大	2007	仍在進行	271,980	有助和為提升有關管理癌症的臨牀實務提供參考
動機式晤談對欠缺動力的心臟病康復者，在臨牀成效、心理和健康生活質素方面的影響	中大	2007	仍在進行	439,750	有助和為制訂有關醫療需要評估的醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
香港低能見度對入院影響的研究	港大	2007	仍在進行	306,360	有助和為制訂有關環境衞生的醫護服務政策提供參考
改變嬰兒餵哺模式：公立醫院停止提供免費嬰兒奶粉對母乳餵哺期長短和純以母乳餵哺情況的影響	港大	2007	仍在進行	321,484	有助和為制訂有關兒童營養的公共衞生及醫護服務政策提供參考
慢性乙型肝炎患者在有關健康的生活質素和健康方面的選擇	港大	2007	仍在進行	400,209	有助和為制訂有關提升管理慢性疾病的臨牀實務政策提供參考
鈣和維生素 D 能否改善患青春期脊柱側凸而骨密度偏低的女童的骨質和脊彎情況？隨機對照試驗研究	中大	2007	仍在進行	799,744	有助和為制訂有關兒童健康的醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
在急性非高血壓自發性腦內出血的個案以電腦斷層血管造影術代替導管血管造影術	中大	2008	仍在進行	76,066	有助和為提升管理中風的臨牀實務提供參考
評核在華裔中風病人使用美國國立神經疾患與卒中研究院(NINDS)有關血管性認知功能損害(VCI)的神經心理學治療指引	中大	2008	仍在進行	312,200	有助和為提升管理中風的臨牀實務提供參考
本港中風發病率及死亡率的趨勢：對公眾健康教育工作及醫療資源運用的影響	中大	2008	仍在進行	74,700	有助和為改善管理中風的病人服務提供參考
醫療融資方案的神經經濟學：付款和省錢的意願研究	中大	2008	仍在進行	79,944	有助和為制訂有關醫療融資的醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
本港大學生病態使用互聯網及相關因素	中大	2008	仍在進行	75,820	有助和為制訂有關醫療需要評估的醫護服務政策提供參考
本港非故意家居受傷：關於本港不致命的非故意家居受傷的風險因素及對公共衛生的影響的橫剖性流行病學研究	中大	2008	仍在進行	642,655	有助和為改善有關家庭暴力的公共衛生及醫護服務政策提供參考
為跌倒而到急症室求診的長者所設的社區職業治療以減少跌倒的計劃	瑪麗醫院	2008	仍在進行	260,280	有助和為改善有關長者護理和減少可避免住院的病人護理提供參考
就患有中度至嚴重慢性腎病的華裔病人出現維生素 D 不足情況進行流行病學研究	港大	2008	仍在進行	200,000	有助和為制訂有關營養和醫療需要評估的醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
香港學生肥胖監察計劃(HKSOS)的兩年跟進研究青少年肥胖及相關行為的趨勢及預測	港大	2008	仍在進行	504,141#	有助和為制訂有關醫療需要評估的醫護服務政策提供參考
在香港甄別糖尿病性視網膜病變的成本效益	港大	2008	仍在進行	800,000	有助和為提升有關管理糖尿病的臨牀實務提供參考
在社區生活的精神病患者的生理健康需要及優質生活模式的選擇	中大	2009	仍在進行	369,205	有助和為改善有關精神健康和醫療需要評估的病人護理提供參考
研究把低劑量血管緊張素轉化成酶抑制劑，以預防因神經吞嚥困難而須以鼻胃管進食的長者患上肺炎的以安慰劑隨機對照的試驗	中大	2009	仍在進行	662,600	有助和為提升有關長者護理和管理慢性疾病的臨牀實務提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
評估中度及嚴重創傷的病人的機能表現	中大	2009	仍在進行	607,656	有助和為改善有關創傷管理的病人護理提供參考
對因無明顯特徵的胸部痛楚而到急症室就診的華裔病人施以「TIMI」及「front door TIMI」治療的預後徵狀限值進行前瞻性的研究	中大	2009	仍在進行	488,480	有助和為提升有關管理心臟病的臨牀實務提供參考
有關漢人 HLA-B*1502 等位基因與抗癲癇藥物所引致的嚴重皮膚反應之間的聯繫：以香港人口為基礎的研究	中大	2009	仍在進行	644,434	有助和為提升有關藥物處方和醫療需要評估的臨牀實務提供參考
以高劑量辛伐他汀治療動脈瘤性蛛網膜下腔出血的成效是否更佳？	中大	2009	仍在進行	577,160	有助和為提升有關管理中風的臨牀實務提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
類澱粉蛋白對中風後癡呆症的影響	中大	2009	仍在進行	477,912	有助和為改善有關長者護理和管理慢性疾病的病人護理提供參考
我們能否以內皮功能測試預測手術後出現的心臟併發症？	中大	2009	仍在進行	563,801	有助和為改善有關麻醉服務的病人護理提供參考
隨機對照臨牀試驗：靜觀認知療法對廣泛性焦慮症的成效及基層醫療護理服務的使用	中大	2009	仍在進行	668,752	有助和為提升有關精神健康和基層護理醫學的臨牀實務提供參考
評估華裔長者作出日常生活決定的智能	中大	2009	仍在進行	269,432	有助和為制訂有關高齡及長者護理的公共衛生及醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
使用口服強的松龍(prednisolone)與口服吲哚美辛(indomethacin)對治療急性類痛風關節炎的比較：多中心、雙盲及隨機試驗	中大	2009	仍在進行	486,080	有助和為提升有關管理慢性疾病的臨牀實務提供參考
就本港病人使用的局部青光眼滴劑作出以實證為本的調整	中大	2009	仍在進行	286,755	有助和為制訂有關管理慢性疾病的醫護服務政策提供參考
量度患有盤骨底肌肉疾病的華裔女性的生活質素和病徵的工具：盤骨底肌肉失調清單和盤骨底肌肉影響問卷的評核研究	中大	2009	仍在進行	213,955	有助和為制訂有關醫療需要評估的醫護服務政策提供參考
協助作出乳癌手術治療決定的措施的效用：隨機對照試驗	港大	2009	仍在進行	411,224	有助和為改善有關管理癌症的病人服務提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
為本港停經後的華南婦女提供具成本效益的骨質疏鬆症介入服務的基準	港大	2009	仍在進行	134,296	有助和為改善有關長者護理的病人服務提供參考
為香港兒童進行齲蛀風險評估計劃的成效	港大	2009	仍在進行	331,896	有助和為提升有關牙齒護理和醫療需要評估的臨牀實務提供參考
為香港華裔人士進行與胃癌有關的幽門螺旋菌檢查的成本效益分析：決定分析法	港大	2009	仍在進行	437,600	有助和為提升有關癌症檢查的臨牀實務提供參考
透過專業母乳餵哺支援介入服務來增加純母乳餵哺比率及延長母乳餵哺期的隨機對照試驗	港大	2009	仍在進行	559,125	有助和為改善有關母嬰健康的病人服務提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
心血管疾病風險因素與椎間盤退化的關係	港大	2009	仍在進行	559,636	有助和為制訂有關醫療需要評估的醫護服務政策提供參考
有關治療香港華裔人士的梗阻性睡眠窒息症在神經認知及社會心理方面的成效	港大	2009	仍在進行	80,358	有助和為改善有關管理慢性疾病的病人護理提供參考
治療遊戲對進行非緊急手術的香港華裔兒童在手術前後出現的焦慮情況和情緒反應的效用：隨機對照試驗	港大	2009	仍在進行	416,906	有助和為提升有關兒童健康的臨牀實務提供參考
社區職業治療計劃對癡呆症患者身體機能和照顧者技能提升的臨牀效用：隨機對照試驗	理大	2009	仍在進行	696,700	有助和為制訂有關長者醫護的醫護服務政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
肉毒毒素能否減輕在院舍接受長期護理的上肢痙攣病人的照顧者的負擔？隨機對照研究	沙田慈氏護養院	2009	仍在進行	550,444	有助和為提升有關長者護理的臨牀實務提供參考
中醫藥主題					
傳統中醫藥對兒童特應性皮膚炎的療效和安全程度進行隨機抽樣、雙盲和安慰劑對照研究	中大	2004	已完成	454,152	有助和為制訂監管和發展中醫實務的政策提供參考
電針對長期頸痛的長遠療效進行隨機對照試驗	浸大	2007	已完成	470,175	有助和為制訂監管和發展中醫實務的政策提供參考
使用中藥治療機能性便秘進行隨機對照試驗	浸大	2007	已完成	464,580	有助和為制訂監管和發展中醫實務的政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額 (港元)	應用相關醫護政策和臨牀實務
採用耳針法和西方藥物的綜合療法以治療不受控制的高血壓	中大	2007	已完成	70,000	有助和為制訂監管和發展中醫實務的政策提供參考
本港西醫對使用傳統中醫藥的態度和行為	中大	2007	已完成	65,000	有助和為制訂監管和發展中醫實務的政策提供參考
評估耳針法對紓緩便秘徵狀和改善安老院舍院友生活質素的效用的先導計劃	公開大學	2008	已完成	67,705#	有助和為制訂監管和發展中醫實務的政策提供參考
就與馬兜鈴酸有關的中毒及疾病的臨牀診斷，對 DNA 附加物作快速和確切的斷定	浸大	2007	仍在進行	561,000	有助和為制訂監管和發展中醫實務的政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額(港元)	應用相關醫護政策和臨牀實務
太極氣功對改善慢性阻塞性肺病患者的呼吸功能和體能耐力的評估	中大	2008	仍在進行	87,200	有助和為制訂監管和發展中醫實務的政策提供參考
對腹腔結腸手術後出現的腸梗阻施以電針治療的隨機假對照研究	中大	2008	仍在進行	377,368	有助和為制訂監管和發展中醫實務的政策提供參考
評估源自中藥的保健食品對紓緩過敏性哮喘症狀的藥理作用	中大	2008	仍在進行	799,480	有助和為制訂監管和發展中醫實務的政策提供參考
有關懷孕期間常用中草藥的安全性的研究	中大	2008	仍在進行	800,000	有助和為制訂監管和發展中醫實務的政策提供參考

項目名稱	研究機構	開始年份	狀況	批核金額 (港元)	應用相關醫護政策和臨牀實務
研究透過血清素的功能，以電針治療加速選擇性血清回收抑制劑所產生的抗抑鬱作用的單盲隨機假對照研究	港大	2008	仍在進行	762,496	有助和為制訂監管和發展中醫實務的政策提供參考
研究可否透過抑制解毒酶(P450 3A4)把苦參(Sophora flavescens)用作抗逆轉錄病毒療法的加強劑	中大	2009	仍在進行	559,524	有助和為制訂監管和發展中醫實務的政策提供參考
			總計	50,311,803#	

有 6 項總值 139 萬元的研究項目已獲醫療服務研究基金未用的結餘資助。由於醫療服務研究基金和衞生及醫護服務研究基金是個別成立的基金，因此醫療服務研究基金不可把結束時的餘款轉撥至衞生及醫護服務研究基金。為了盡量擴大研究和公共衞生方面的效益，醫療服務研究基金已在研究局的同意下，運用其剩餘的資源資助衞生及醫護服務研究基金一些早期進行的研究項目。

HEALTH AND HEALTH SERVICES RESEARCH FUND

MWW Myint 邱慧慧
FC Yuen 阮鳳姿
KK Yu 余劍琴
PL Kng 康佩玲
MY Wong 王美儀
KC Chow 周傑志
CK Li 李志剛
CP Wong 王春波

Use of constraint-induced movement therapy in Chinese stroke patients during the sub-acute period

Key Messages

1. Constraint-induced movement therapy is an effective technique for the rehabilitation of sub-acute stroke patients with moderately impaired arm function.
2. It proved superior to conventional occupational and physical therapy over a 10-day period in a day hospital setting and the effects were maintained at 12 weeks.

Hong Kong Med J 2008;14(Suppl 5):S40-2

Ruttonjee Tang Shiu Kin Hospital, 266 Queen's Road East, Wan Chai, Hong Kong SAR, China
Department of Integrated Medical Services
MWW Myint, KK Yu, PL Kng, CP Wong
Department of Occupational Therapy
FC Yuen, MY Wong, KC Chow, CK Li

HHSRF project number: 02030011

Principal applicant and corresponding author:
Dr Chun-por Wong
Department of Integrated Medical Services, Ruttonjee Tang Shiu Kin Hospital, 266 Queen's Road East, Wan Chai, Hong Kong SAR, China
Tel: (852) 2291 1333
Fax: (852) 2291 1335
E-mail: cpwong@ha.org.hk

Introduction

Stroke is the most common cause of disability in the adult and elderly population in the world and a major cause of hospitalisation. Long-term motor deficits in stroke patients may be due to 'learned non-use', a process enhanced by the teaching of compensatory activity during rehabilitation. Recovery may be improved by constraint-induced movement therapy (CIMT) or 'forced use'[1,2] which involves restraining the unaffected upper extremity (UE) and training the affected extremity.

Aims and objectives

This study aimed to investigate whether CIMT can improve function in hemiplegic upper limbs during the sub-acute period after strokes in Chinese patients. A secondary aim was to investigate whether adding CIMT to the stroke rehabilitation service in Hong Kong is feasible.

Methods

This study was conducted from November 2004 to November 2005 and is a randomised controlled study comparing the pre-intervention, post-intervention, and 12th-week UE function in patients with strokes. The observer was blinded and the subjects were randomised by drawing sealed envelopes. Subjects were recruited from the acute stroke and rehabilitation services of three regional hospitals.

The inclusion criteria were: being 2 to 16 weeks after an ischaemic or haemorrhagic stroke; hemiparesis, with the affected limb having a functional level of grade 3 to 6; minimal movement of ≥20 degrees of wrist extension and ≥10 degrees of extension of all digits; being ethnically Chinese; and achieving a score of 17 or above in the Cantonese version of the mini-mental state examination (MMSE) .The subjects also needed to be able to ambulate with or without aid. The exclusion criteria were severe aphasia, a high risk of falling, cerebellar stroke, and severe shoulder pain affecting therapy.

The intervention group underwent a 10-day training programme given by a designated occupational therapist, focusing on the hemiplegic UE with the unaffected limb restrained in a shoulder sling. The intervention subjects signed a contract in which they agreed to wear a padded shoulder sling for most of the day, except during high-risk activities, during the 10-day treatment period. The subjects were treated with 4 hours of supervised activities including shaping, which is a behavioural method used to improve motor performance using small increments and encouragement with positive feedback and increasing level of difficulty.

The control group received standard occupational and physical therapy, which included bimanual tasks for the UE, compensatory techniques for activities of daily living, hemiplegic UE strength and range of motion, positioning and mobility training. Both groups received 4 hours of therapy daily, 5 days per week, for 2 consecutive weeks.

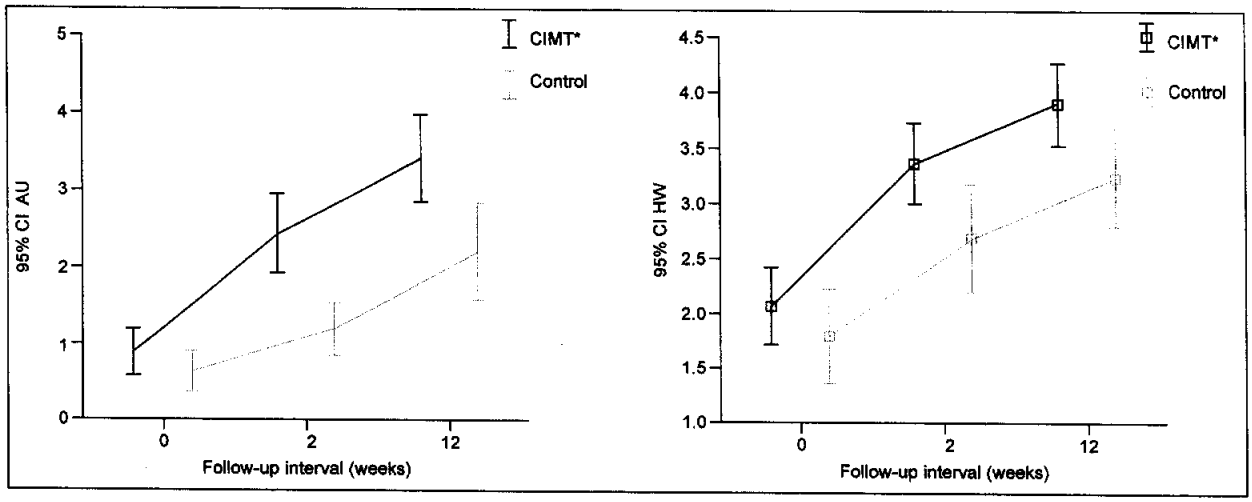

Fig 1. Motor Activity Log: amount of use (AU) scale and how well (HW) scale
* Statistically significant; CI denotes confidence interval, and CIMT constraint-induced movement therapy

The primary end points for this study include the real world measure of Motor Activity Log (MAL) score and the laboratory UE functional measure Action Research Arm Test (ARAT), after 2 and 12 weeks. The secondary outcomes were measured by using the modified Barthel Index and the ability to complete the Nine Hole Peg test.

Results

There were 122 patients available for recruitment and of these, 23 patients were recruited to the intervention group and 20 enrolled in the control group. Five patients refused to begin the intervention after randomisation and consent and three patients dropped out after beginning CIMT. The intervention group was recruited at a mean interval of 38.2 (standard deviation [SD], 20.4) days from the onset of their stroke. All subjects were assessed 2 weeks after therapy began but two patients from the CIMT group could not be assessed at 12 weeks as one died of liver malignancy and one was lost to follow-up. The patients in the control group were recruited at a mean interval of 44.9 days (SD, 28.6) from the onset of their strokes. One patient suffered a recurrent stroke and could not be assessed at 12 weeks.

Baseline characteristics including age, sex, type of stroke, laterality, interval between onset of stroke and therapy, presence of hemianaesthesia, presence of hemi-neglect and the level of functional return at the baseline assessment were comparable. Baseline variables such as the MMSE, functional test for hemiplegic upper limb, MAL which consists of the amount of use scale (AU) and the how well scale (HW), ARAT, Nine Hole Peg test and modified Barthel Index showed non–statistically significant differences between the control group and CIMT group.

The outcome measurements at the pre-intervention [0], post-intervention [2] and 12th-week [12] assessments are presented in Figures 1 and 2. After the intervention, the mean MAL scores comprising the amount of AU and HW improved significantly over the two observation points in the intervention group (F=12.673, P=0.001 for AU and F=5.816 P=0.021 for HW).

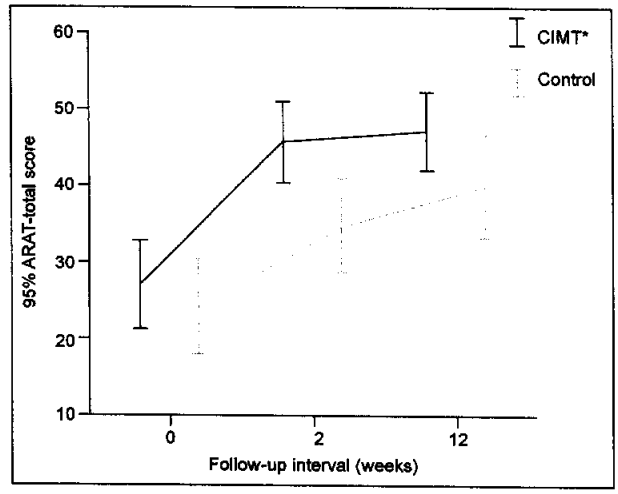

Fig 2. Action Research Arm Test (ARAT) [total score]
* CIMT denotes constraint-induced movement therapy

The sub-components of the ARAT were compared by using the Kruskal Wallis test. The intervention group's grasp (P=0.004), grip (P=0.004), pinch (P=0.032) and gross (P=0.006) components were found to have improved significantly over the control group after the first 2 weeks. Their grip component (P=0.019) and the total ARAT score using analysis of covariance (F=7.601, P=0.009) were superior to the control group at 12 weeks. There was no significant difference, however, in the grasp, pinch and gross components at 12 weeks. This early plateauing of the hemiplegic UE function is illustrated in Figure 2.

The Nine Hole Peg test could only be performed by those with a high level of UE function as it requires considerable dexterity. The number of patients who could perform this test at baseline was not significant—eight (35%) in the intervention group and six (30%) in the control group. After CIMT, 16 (70%) patients were able to perform the test, significantly more than the nine (45%) control group patients who could perform it during the post-intervention assessment (P=0.022). A similar trend was evident at 12 weeks (P=0.029).

There were no significant differences in Modified Barthel Index scores at assessments 2 and 3 (F=1.083 P=0.305). No major complications occurred. One patient complained of exacerbation of shoulder pain 1 month after the end of the intervention period. There were no falls documented in all 23 CIMT patients.

Discussion

Theoretically, early implementation of CIMT during the sub-acute stroke period may minimise learned non-use of hemiplegic upper limbs. Another explanation may be neural re-organisation: there is some biological evidence supporting the role of early training of the affected limb to maximise neuroplasticity.[3]

This study demonstrates that use of CIMT in the sub-acute period after a stroke improved subjective and objective measures of UE function in our patients. Although these functional gains plateaued over 12 weeks, most of the improvements were still significant at the 12-week assessment.

Some safety issues have been raised over the use of CIMT in sub-acute rehabilitation settings. Painful overuse syndromes, the risk of falls, and the frustration engendered by focusing on a weak and clumsy limb have been cited as potential problems. In this study, only one patient reported exacerbation of shoulder pain, 1 month after the end of the intervention period.

There are concerns about starting CIMT in the acute stroke period raised by finding that lesioned rats started on CIMT immediately had their lesions enlarged.[4] Human studies of use of CIMT in the acute period (within 1 to 2 weeks of the stroke) have not shown any clinical adverse effects although neuro-imaging data are lacking. Our patients were recruited relatively late after their strokes, averaging 38 to 44 days, so there were no major concerns about early lesion enlargement.

Conclusion

Constraint-induced movement therapy was able to improve the rate of recovery of upper limb function during the sub-acute phase post-stroke in this subset of Hong Kong Chinese patients and the improvement was maintained at 12 weeks. The feasibility of applying this therapy was demonstrated by its effective use in a Geriatric Day Hospital setting.

Acknowledgements

This study was supported by the Health and Health Services Research Fund (HHSRF), Food and Health Bureau, Hong Kong SAR Government (HHSRF: 02030011).

The final, definitive version of this paper has been published in A Study of Constraint Induced Movement Therapy in Sub-acute Stroke Patients in Hong Kong. *Clinical Rehabilitation*, Vol 22, Issue 2, February 2008 by SAGE Publications Ltd, All rights reserved. © Published online at http://cre.sagepub.com/cgi/content/abstract/22/2/112.

References

1. Taub E, Miller NE, Novack TA, et al. Technique to improve chronic motor deficit after stroke. Arch Phys Med Rehabil 1993;74:347-54.
2. Taub E, Uswatte G. A new approach to treatment and measurement in physical rehabilitation: constraint-induced (CI) movement therapy. In: Frank R, Elliott T, editors. Handbook of rehabilitation psychology. Washington, DC: American Psychological Association; 2000.
3. Grotta JC, Noser EA, Ro T, et al. Constraint-induced movement therapy. Stroke 2004;35(11 Suppl 1): 2699S-2701S.
4. Risedal A, Zeng J, Johansson BB. Early training may exacerbate brain damage after focal brain ischemia in the rat. J Cereb Blood Flow Metab 1999;19:997-1003.

CWH Chan 陳葉詠嫻
KKF Cheng 鄭健芳
LW Lam 林麗華
CK Li 李志光
KW Chik 戚其威
JSS Cheung 張瑞心

Psycho-educational intervention for chemotherapy-associated nausea and vomiting in paediatric oncology patients: a pilot study

Key Messages

1. Descriptive data suggest that progressive muscle relaxation and education offer benefits by reducing vomiting, and promoting the use of anti-emetic as a preventive measure.
2. Both interventions were well accepted by patients and their parents.
3. The current pilot study supports the feasibility and appropriateness of the study design.

Hong Kong Med J 2008;14(Suppl 5):S32-5

The Nethersole School of Nursing, The Chinese University of Hong Kong, Shatin, NT, Hong Kong SAR, China
CWH Chan, KKF Cheng, LW Lam
Department of Paediatrics, Prince of Wales Hospital, The Chinese University of Hong Kong, Shatin, NT, Hong Kong SAR, China
CK Li, KW Chik, JSS Cheung

HHSRF project number: 02030031

Principal applicant and corresponding author:
Prof Carmen WH Chan
The Nethersole School of Nursing, The Chinese Unviersity of Hong Kong, Shatin, NT, Hong Kong SAR, China
Tel: (852) 2609 6218
Fax: (852) 2603 5935
E-mail: whchan@cuhk.edu.hk

Introduction

Intensive chemotherapy (CT) regimens are widely used to treat childhood malignancies and are generally more emetogenic than those used in adults. A survey on chemotherapy-associated nausea and vomiting (CANV) in children reported a prevalence of 67 to 71% during CT and 77 to 82% after the CT cycle.[1]

As the severity of CANV may become cumulative over time,[2] preventive measures given to chemotherapy-naive patients are considered the most efficacious. The four pathways through which the vomiting centre can be stimulated are: the cerebral cortex and limbic system; the vestibular system; the chemoreceptor trigger zone; afferent vagal and visceral nerves (Fig).[3] Based on this theoretical framework of the neural pathways involved in transmission of emetic stimuli,[3] a multi-dimensional psycho-educational programme combining the use of relaxation techniques (progressive muscle relaxation [PMR]) and patient education has been developed by the authors (Fig). Relaxation techniques block the cerebral and limbic system cortical pathway. Patient education focusing on risk assessment, use of antiemetics, and meal preparation works by blocking the other three pathways. It appears logical to adopt a comprehensive programme able to block all emetic stimuli pathways, however, each major component of the programme needs to be examined separately in an exploratory trial. This pilot study aimed to assess the feasibility of using the two major components—relaxation and patient education—of a comprehensive programme.

Methods

This study was conducted from January 2005 to December 2006. An exploratory trial using a pre- and post-test control group design was used.

Intervention

Group 1: Six sessions of PMR and guided imagery (GI) training (day 0-5; 30 minutes/session) were administered as recommended by Baider et al,[4] then the skill was practised daily for a period of 2 months; PMR and GI audiotapes were provided. Group 2: Two patient/parent education sessions were given (day 0 and day 2; 30 minutes/session) focusing on risk assessment, antiemetic use, and meal planning.

Outcome measures and instruments

Primary outcome measures were nausea and vomiting (Morrow Assessment of Nausea and Emesis, MANE). Secondary outcome measures were anxiety (child and parent) [The Chinese version of A-State scale of the State–Trait Anxiety Inventory], quality of life (Play Performance Scale for Children), physiological indices (caloric intake, changes in body weight), use of antiemetics, satisfaction with care (4-point Likert scale indicating extremely unsatisfactory [0] to extremely satisfactory [3]), self-rating of the usefulness of intervention (6-point Likert scale indicating extremely useful [5] to not at all useful [0]), health diary noting PMR and GI practice.

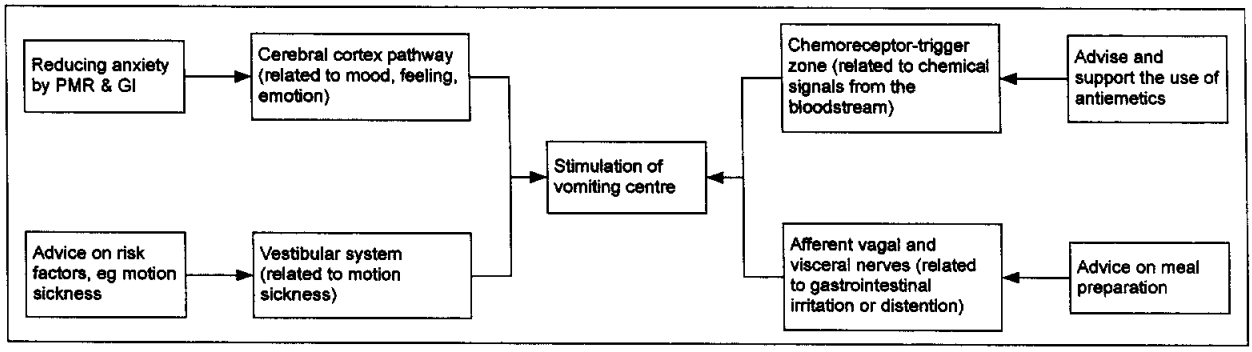

Fig. Rationale supporting the relationship between chemotherapy-associated nausea and vomiting and proposed intervention
PMR denotes progressive muscle relaxation, and GI guided imagery

Table 1. Inventions and data collection periods

Interventions*	Day†									
	0	1	2	3	4	5	6	7	30	60
Group 1 intervention: PMR (including GI)	√	√	√	√	√	√				
Group 2 intervention: education	√		√							
MANE	√	√	√	√	√	√	√	√		
Anxiety	√			√				√	√	√
Satisfaction with care	√			√				√	√	√
Caloric intake, body weight, antiemetic use	√	√	√	√	√	√	√	√		
Quality of life	√			√				√	√	√
Usefulness of intervention		√		√				√		
Intervention log	√	√	√	√	√	√				
Pulse and blood pressure (group 1 only)	√	√	√	√	√	√				
Health diary of PMR and GI (daily for 2 months continuously), group 1 only	√	√	√	√	√	√	√	√	√	√
Control group historical data: body weight, vomiting, antiemetic use	√	√	√	√	√	√	√	√		

* PMR denotes progressive muscle relaxation, GI guided imagery, and MANE Morrow Assessment of Nausea and Emesis
† Day 0=1 day prior to CT, day 1=CT commencing date

Procedure

All consenting subjects completed a full set of instruments at baseline, then 7 days post-CT making in total 8 days' measurements. Long-term data were collected 1 month and 2 months after the intervention and assessed quality of life, anxiety, compliance with PMR and GI (group 1 only), and satisfaction with care. The interventions and data collection periods are detailed in Table 1.

Setting and subjects

A total of 20 subjects were recruited from the paediatric oncology unit of a publicly funded hospital in Hong Kong. Inclusion criteria were: being aged from 4 to 11 years, having a diagnosis of cancer requiring CT, being chemotherapy-naive, being able to understand Cantonese, signed informed consent (both patients and parents). Exclusion criteria were patients with brain metastases and/or advanced stage cancer.

Results

During the study period, 24 subjects who met the eligibility criteria were approached and 20 of these agreed to participate in the intervention groups. Ten historical control cases who matched the characteristics of group 1 subjects formed group 3. Another 10 historical control cases who matched the characteristics of group 2 subjects formed group 4.

Baseline characteristics of the study sample

The mean age was 8.6 years. The majority (n=20) had acute lymphocytic leukaemia, followed by osteosarcoma (n=12). None had vomited immediately after CT at baseline (day 0). There was no difference in diagnoses, age, body weight, and episodes of vomiting at baseline between the subjects in the intervention and control groups.

Subjects in group 1 had significantly lower levels of child anxiety ($Z= -2.14$, $P=0.032$) than those in group 2 at baseline. Parents of subjects in group 1 also had a lower mean score of anxiety, although this result was not statistically significant.

Comparison between intervention groups and control groups

The Kruskal Wallis test did not detect a significant difference ($P>0.05$) between the groups at each data collection time. All groups had a slight decrease in body weight (<1 kg) over the 8-day period. Significant within-group changes in body weight were detected only in group 2 ($P=0.01$) using the Friedman test (Table 2).

In terms of vomiting after CT commenced, a significant

Table 2. Body weight of each study group from day 0 to 7

Group		Body weight (kg)							
		Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
1	Mean	37.93	38.29	38.08	37.69	37.54	37.80	37.49	37.43
	SD	16.52	16.96	16.97	16.57	16.38	16.30	15.97	15.76
2*	Mean	41.29	41.65	41.51	41.18	40.82	41.02	40.95	40.93
	SD	14.63	14.80	14.96	14.59	14.40	14.30	14.40	14.19
3	Mean	40.83	40.99	40.87	40.49	40.31	40.14	40.24	40.20
	SD	19.16	19.57	19.39	19.28	19.22	19.26	19.33	19.10
4	Mean	45.19	44.88	44.85	44.66	44.56	44.49	44.30	44.28
	SD	17.37	17.64	17.52	17.57	17.60	17.71	17.65	17.44
Total	Mean	41.31	41.45	41.32	41.00	40.80	40.86	40.74	40.71
	SD	16.54	16.81	16.78	16.61	16.52	16.50	16.46	16.26

* P<0.05

Table 3. Number of patients experiencing nausea, vomiting and their antiemetic intakes from day 0 to 7, by group

	Group	Day							
		0	1	2	3*	4	5	6	7
Intake of antiemetic	1	5	5	4	2	1	1	0	1
	2	7	6	3	5	4	4	0	0
	3	0	3	8	3	2	1	1	0
	4	0	4	10	3	3	3	1	0
Vomiting after chemotherapy*	1	0	0	2	4	3	2	2	4
	2	0	0	3	7	7	1	2	1
	3	0	1	3	6	7	5	6	5
	4	0	0	7	10	6	6	5	5
Nausea after chemotherapy	1	0	2	5	4	4	4	5	6
	2	0	5	6	8	8	8	4	6
Nausea before chemotherapy	1	1	1	2	3	2	2	3	3
	2	1	3	4	6	6	4	2	2
Vomiting before chemotherapy	1	5	0	1	2	1	1	1	2
	2	3	0	3	5	3	1	1	1

* P<0.05

difference was detected on day 3 only (Chi squared=8.54, P=0.036). Fewer patients in the PMR group (group 1) experienced vomiting. There was no significant difference in the intake of antiemetic between groups. Descriptive data show that more patients in the control groups than those in the intervention groups took antiemetics on day 2. There was also a trend for more patients in the intervention group to take antiemetics before beginning CT (on day 0) but fewer patients in these groups took antiemetics from day 2 onwards. In contrast, none of the patients in the control groups took antiemetics on day 0 but more patients in these groups began to take antiemetics on day 2 (Table 3).

Comparison between the PMR group and education group

There were no statistically significant differences (P>0.05) in body weight, experience of nausea and vomiting, and antiemetic intake between the two intervention groups. The Friedman test found that both groups 1 and 2 had significant within-group changes in parent anxiety levels (group 1 at P=0.005, group 2 at P=0.001) and that the parents' anxiety levels decreased over time from day 0 to 60.

There was no significant difference in the child's quality of life and parent's satisfaction with care between the PMR group (group 1) and the education group (group 2). The children's quality of life was lower from day 3 to 30 after the commencement of CT in both groups.

There was no significant difference in calorie intake between the PMR and education groups. There was a trend for patients in both groups to have their lowest calorific intake on days 2 to 3. Their calorie intakes gradually improved from day 4 to 7. The Friedman test found that a within-group change in calorie intake in group 2 was significant (P=0.001), with a drastic reduction in calories on days 2-3.

Process evaluation

Analysis of the health diaries indicated that the majority of patients practised PMR 3 to 4 times a week at home, indicating moderate compliance with PMR self-practice. Mann-Whitney *U* tests did not detect significant changes in blood pressure and pulse rates after practising PMR.

Patients' and parents' perceptions of the usefulness of the interventions were that they were moderately useful. The Mann-Whitney *U* test found a significant difference only in day 1 anxiety reduction (Z= –0.314, P=0.032); the PMR was perceived as more useful in anxiety reduction. There was a trend toward higher overall usefulness of the intervention scores in the PMR group.

Discussion

Subject recruitment for this pilot study was feasible but took longer than expected. It took 18 months to recruit 20 eligible and consenting patients. This raises a concern about adequate recruitment for a larger full study. All patients in the intervention groups adhered to the intervention and completed the instruments without difficulty, indicating the appropriateness of these age-appropriate interventions and the data collection process.

Progressive muscle relaxation was found to significantly reduce vomiting on day 3 after the commencement of chemotherapy, the day that the majority of patients in this study experienced CANV and reported lower quality-of-life levels and less satisfaction with care. Moreover, fewer patients in both intervention groups suffered from vomiting from day 2 to day 7, when compared with the control groups. The theoretical framework of the neural pathways involving in transmitting emetic stimuli (Fig)[3] suggests that PMR and education may be reducing vomiting by interfering with the transmission of stimulation of the cerebral cortex pathway, the vestibular system, the chemoreceptor trigger zone, and the afferent vagal and visceral nerves.

Although there was no statistical difference in antiemetic intake between the intervention and control groups, it appears that more patients in the intervention groups took antiemetics on day 0 prior to the CT, whereas none of the patients in control group did. This could be due to a greater awareness of nausea and vomiting and an accompanying increase in knowledge about and motivation to take antiemetics as a preventive measure, as a result of participating in the intervention. This preventive measure may have led to less vomiting from day 2 to day 7 in the intervention groups. As the severity of CANV is cumulative over time, this finding supports the importance of giving preventive measures to CT-naive patients prior to the commencement of CT.

There is no evidence supporting the superiority of PMR or patient education in terms of managing CANV and the maintenance of body weight. In both intervention groups, parents' anxiety levels lessened significantly over time, supporting their potential effects on parental anxiety reduction. This is an important benefit of the intervention, as a significant correlation between CANV and parental anxiety has been reported previously.[2]

The only difference found between PMR and education was the effect on calorie intake. It is surprising to note that the calorie intake was drastically reduced on day 2 to 3 within the education group as the education session is supposed to help patients to select a diet able to promote their calorie intake. In contrast, the PMR group's calorie intake appears to have been more stable, suggesting that relaxation has a beneficial effect on dietary intake, a finding in line with that of a previous study.[5]

Conclusion

This pilot study supports the feasibility and appropriateness of the study design including subject recruitment, randomisation, implementation of the interventions, and measurement of the outcomes. Although we have not statistically proven any beneficial effects of PMR and education as a means of reducing CANV in this pilot study, descriptive data suggest the intervention achieved a reduction in vomiting and promoted the use of antiemetics as a preventive measure.

Acknowledgement

This study was supported by the Health and Health Services Research Fund, Food and Health Bureau, Hong Kong SAR Government (HHSRF: 02030031).

References

1. Frick SB, Guzzi DelPo E, Keith JA, Davis MS. Chemotherapy-associated nausea and vomiting in pediatric oncology patients. Cancer Nurs 1988;11:118-24.
2. Dolgin MJ, Katz ER, McGinty K, Siegel SE. Anticipatory nausea and vomiting in pediatric cancer patients. Pediatrics 1985;75:547-52.
3. Fessele KS. Managing the multiple causes of nausea and vomiting in the patient with cancer. Oncol Nurs Forum 1996;23:1409-15.
4. Baider L, Uziely B, De-Nour AK. Progressive muscle relaxation and guided imagery in cancer patients. Gen Hosp Psychiatry 1994;16:340-7.
5. Burish TG, Tope DM. Psychological techniques for controlling the adverse side effects of cancer chemotherapy: findings from a decade of research. J Pain Symptom Manage 1992;7:287-301.

FF Eves
RSW Masters 馬兆德
AM McManus 麥雅麗

Effects of point-of-choice stair climbing interventions in Hong Kong

Key Messages

1. Only one of three stair climbing interventions changed stair climbing in the Hong Kong Chinese population; this 0.29% increase suggests that stair climbing interventions will have minimal impact on public health.
2. Climate and terrain may be major barriers to lifestyle physical activity interventions in Hong Kong.

Hong Kong Med J 2008;14(Suppl 5):S36-9

School of Sport and Exercise Sciences, University of Birmingham, United Kingdom
FF Eves
Institute of Human Performance, The University of Hong Kong, Pokfulam, Hong Kong SAR, China
RSW Masters, AM McManus

HHSRF project number: 02030081

Principal applicant and corresponding author:
Dr Rich SW Masters
Institute of Human Performance, 111-113 Pokfulam Road, The University of Hong Kong, Pokfulam, Hong Kong SAR, China
Tel: (852) 2589 0586
Fax: (852) 2855 1712
E-mail: mastersr@hku.hk

Introduction

Increasing physical activity levels is a major public health target given the high prevalence of sedentary behaviour in the industrialised world.[1] The current recommendations are for at least 30 minutes of moderate-intensity physical activity on 5 or more days of the week, which can be accumulated throughout the day and does not need to be achieved in a single session.[1]

One simple way to achieve the current recommendations is to accumulate walking throughout the day. An additional way to further this aim is to accumulate stair climbing. Like walking, stair climbing requires no equipment and is freely available, at least in the developed world. Unlike walking, however, stair climbing is physiologically vigorous, requiring 9.6 times more energy than the resting state.[2] As obesity prevention is a major aim of physical activity promotion, the high energy expenditure of stair climbing can improve the balance between energy intake and expenditure. For example, an 80-kg man climbing a typical 3-m flight of stairs 10 times a day would expend approximately 27.5 Kcals a day, equating to 10 038 Kcals over a year, an energy expenditure equivalent to about 4 days worth of food.[3] From an energy expenditure perspective, the speed at which the stairs are climbed is of minimal importance; energy is expended in raising one's weight against gravity. Thus low levels of fitness, a common barrier to exercise in the overweight, are not a barrier to stair climbing. Indeed a recent worksite intervention revealed a greater response in overweight employees suggesting that stair climbing may be an acceptable type of physical activity for overweight individuals.[3]

Importantly, interventions to increase stair climbing are effective. Typically, a poster placed at the point-of-choice between stairs and the escalator encourages travellers to take the stairs for the benefit of their health.[2] Almost all published studies have successfully increased stair usage with 23 separate studies reporting positive effects. Nonetheless, most previous research has been conducted in either the UK or the US and only two studies have used non–English speaking populations. Thus, studies in a non-English context provide information on the generality of the success of stair climbing interventions. Here we report the results of three interventions in Hong Kong where 95% of the population is Chinese.

Compared to mainland China, Hong Kong is affluent and has many of the trappings of western culture, making it a reasonable non-English speaking comparison for the UK and the US. The Population Health Survey revealed that only 14% of males and 12% of females in a representative sample of 7084 Hong Kong Chinese were physically active at health enhancing levels, which is considerably lower than in the UK (males 37%, females 25%).[1,4] The territory itself includes a densely populated small island (18 000/km) with restricted opportunities for outdoor sport and exercise. Most of the population, however, live and work in high-rise buildings providing convenient opportunities for stair climbing. While this behavioural context makes Hong Kong island an ideal setting for accumulation of stair climbing, the climate is subtropical with high temperatures and humidity levels. We provide here preliminary data on the possible effects of climate on interventions that promote active transport.

Methods

This study was conducted from May 2005 to August 2006.

Study design

All three studies used an interrupted time-series design. Thus, monitoring of stair use for a baseline period was followed by the interruption of the series by an intervention aimed to increase stair climbing. Monitoring was continued after this interruption.

Studies 1 and 2 were conducted on the Mid-Levels escalator system in central Hong Kong, a pedestrian transit system that reduces motorised traffic in the city. The interventions were installed on the section between Wyndham Street and Hollywood Road where a travellator, ie an escalator without steps, climbed 5.72 m over a horizontal distance of 51.5 m, with a total length of 57.5 m. Adjacent to the travellator were 44 stairs (stair riser height=13 cm) in groups of four separated by 4.12 m horizontal sections. While this site was shielded from the sun, open sides meant that pedestrians were subject to the effects of air temperature and humidity. Study 3 was conducted in an air-conditioned, indoor shopping mall (Lok Fu) where the effects of outdoor climate may have been nullified.

Sample size

There were 57 801 subjects in Study 1, 76 710 in Study 2, and 18 257 in Study 3.

Study instruments

In all studies, observers coded pedestrian choices between the travellator/escalator and stairs. While there was variation between studies, the categories used were gender, appearing to be over 60 years of age, ethnic grouping, presence of children or large bags, and whether the pedestrian was walking on the travellator. Observations were made around midday (11:00-13:00) and in the early evening (17:00-19:00).

Study 1

Following 2 weeks of baseline observations, a 73 cm x 53 cm poster was positioned at the choice point between the stairs and travellator and observations continued for a further 2 weeks. The poster contained a silhouette figure climbing stairs with a message above the figure in Chinese characters that read 'Get healthy – start with these steps'.

Study 2

Following 1 week of baseline observations, three banners (200 cm wide x 50 cm high) were hung above the heads of pedestrians on the travellator and monitoring continued for a further 5 weeks. The back-translated messages in order of ascent were (a) 'Just need 7 minutes a day, getting healthy and living longer is not a dream', (b) 'Doctors found that spending 7 minutes on stair climbing a day, the risk of heart disease is reduced by half in 10 years', and (c) 'There are 1440 minutes in a day, it only takes you 7 minutes to be healthy and live longer'. In the focus group phase, the '7 minutes stair climbing a day etc' message was rated as 4.1 on a 1-5 scale from least (1) to most (5) motivating.

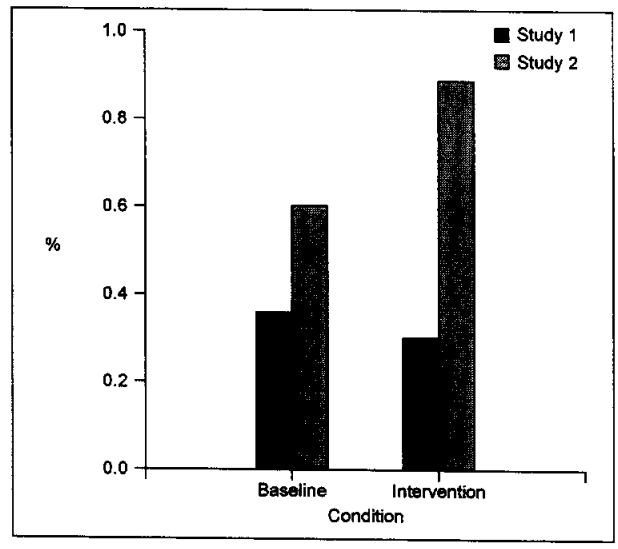

Fig 1. Percentage of stair climbing during baseline and following the intervention on the Mid-Levels escalator system

Study 3

Following 2 weeks of baseline observations, the intervention was affixed to 12 stair risers beginning five steps from the top on a 22 step staircase (riser height=14 cm). Hence the stair riser banner was 210 cm wide by 168 cm high. Messages (a) and (b) above were used with a cartoon of a smiling heart accompanying these messages. Monitoring continued for 2 weeks.

Results

Stair climbing

Figure 1 depicts the percentage of people climbing stairs during the baseline period and after installation of the poster (Study 1) and banners (Study 2) on the Mid-Levels system. No significant change in stair climbing occurred in Study 1 (P=0.29), whereas there was a modest increase in stair climbing when the more extensive intervention was tested in Study 2 (+0.29%, P=0.002).

The small magnitude of increase suggests that the intervention was of minimal public health relevance. Study 3 tested a similar intervention in a shopping mall, the main setting for previous stair climbing interventions outside Hong Kong.[2] It was possible that the mass transit nature of the Mid-Levels system produced unusual results. In addition, Lok Fu shopping mall was air-conditioned and hence potentially immune to the effects of climate on lifestyle physical activity (see below). As with the previous studies, however, there were no effects of the intervention (P=0.91; Fig 2).

Walking up the travellator

As outlined elsewhere, the poster used in Study 1 produced an increase in walking up the travellator in the Hong Kong

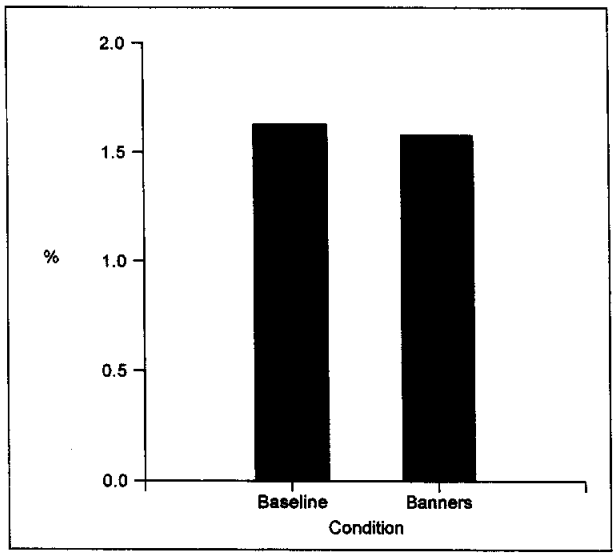

Fig 2. Percentage of stair climbing during baseline and following the intervention in Lok Fu shopping mall

Chinese population.[4] This result demonstrates that Hong Kong Chinese people can respond to physical activity promotion. For the non-Asian sample, however, walking up the travellator was reduced at higher levels of humidity.

In Study 2, the greater range of climate variables (eg humidity 28-93% vs 84-97%) revealed effects in Asian pedestrians. Figure 3 summarises the effects of humidity and temperature on walking up the travellator. The negative slope for both variables reveals that increases in humidity (P=0.009) and temperature (P=0.04) were associated with a reduction in walking.

Discussion

In summary, rates of stair climbing in Hong Kong were low and generally uninfluenced by the interventions; even the modest change in Study 2 (+0.29%) would have little public health impact. To put this in perspective, the rate for adults of 1.6% at baseline on a 3.08 m staircase in the air-conditioned shopping mall of Study 3 contrasts sharply with a baseline rate of 12.6% on an equivalent height staircase in a UK shopping mall.

The low levels of stair usage in these studies were remarkable compared with average rates of 5.4% for public access staircases in the UK and US.[2] Informal observations suggest that stair climbing was also rare in the underground rail system whereas average rates of 11.6% (range, 5.6-31.1%) have been reported for the UK and US.[2] Further, a recent intervention to increase stair climbing in public housing estates in Hong Kong revealed that only 1.7% of pedestrians climbed stairs prior to the intervention.[5] Nonetheless, 90% of respondents on the housing estates thought stair climbing was good for their health prior to the intervention. Therefore low rates of stair climbing were not accompanied by negative perceptions of the behaviour. Taken together, these studies suggest low rates of stair usage may be characteristic of Hong Kong. Two aspects of Hong Kong island itself may be relevant. First, the high humidity of a sub-tropical climate could be a barrier. Set against this, neither study revealed any effects of climate variables on stair climbing. Further, transposing the intervention to an air-conditioned shopping mall did not improve the outcome of the intervention. Hence concurrent levels of humidity and temperature do not explain the failure to increase stair climbing. Alternatively, the topography of Hong Kong may be relevant. Hong Kong island is hilly/mountainous,

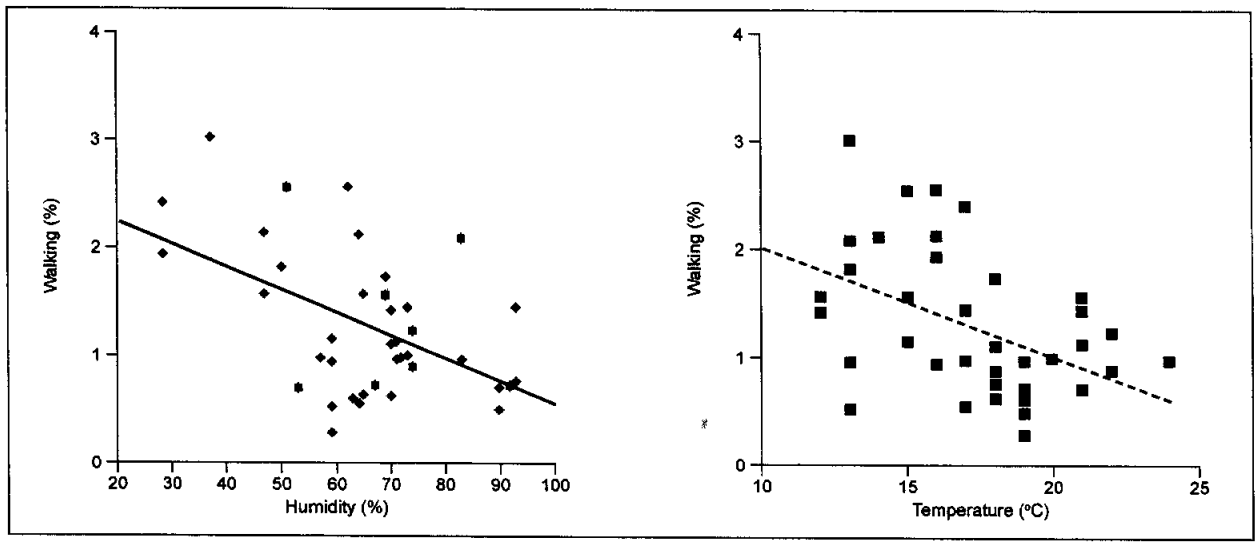

Fig 3. The effect of humidity and temperature on walking up the travellator by the Hong Kong Chinese population

with much of the island associated with steep slopes. The densely populated area of Hong Kong means that there is little space available for parking cars. At 47 cars per 1000 inhabitants, Hong Kong has a very low rate of car ownership compared to other major cities (Tokyo=266, New York=206, London=413). This lack of private cars means that active transport and regular negotiation of the hilly terrain are an inevitable consequence of residence in Hong Kong. Objective measures of hills in other cities have been associated with reduced use of active transport. Against such a backdrop of prior negotiation of hilly terrain, additional ascent of stairs when there is a motorised alternative may seem a profligate waste of energy to Hong Kong pedestrians.

Consistent with previous effects, active transport by Hong Kong pedestrians was reduced as humidity increased and climate may be a major barrier to lifestyle physical activity.[4] We argued elsewhere that the choice of an escalator rather than stairs reflects the repeated reinforcement of escalator use by reduced energy expenditure[4]; minimisation of energy expenditure is characteristic of human locomotion. By the same logic, repeated pairing of any behaviour with punishment reduces the likelihood of the behaviour. Physical activity in humid conditions is associated with increased ratings of discomfort relative to the same activity in low humidity at the same temperature. Hence high rates of humidity in Hong Kong would act to punish lifestyle physical activity and the low rates of stair climbing may reflect a prior history of punishment when attempting physical activity in humid conditions rather than any differences in attitude to physical activity compared to UK and US pedestrians. The hilly terrain of Hong Kong can only compound this problem.

Acknowledgements

This study was supported by the Health and Health Services Research Fund, Food and Health Bureau, Hong Kong SAR Government (HHSRF: 02030081). We thank Moon Leung, Peggy Wong, and Eva Chu for help with data collection and are grateful to Link Management Ltd, Sino Property Management Ltd, Guardian Property Management Ltd, and the Electrical & Mechanical Services Department for their support.

References

1. Department of Health. At least five times a week: evidence on the impact of physical activity and its relationship to health. A report from the Chief Medical Officer. London: Department of Health; 2004.
2. Eves FF, Webb OJ. Worksite interventions to increase stair climbing; reasons for caution. Prev Med 2006;43:4-7.
3. Eves FF, Webb OJ, Mutrie N. A workplace intervention to promote stair climbing: greater effects in the overweight. Obesity (Silver Spring) 2006;14:2210-16.
4. Eves FF, Masters RS. An uphill struggle: effects of a point-of-choice stair climbing intervention in a non-English speaking population. Int J Epidemiol 2006;35:1286-90.
5. An evaluation study on the pilot programme of stair climbing promotion in public housing estates 03-04. Hong Kong SAR: Department of Health; 2004.

WWT Lam 藍詠德
R Fielding 莊日昶
M Chan 陳志梅
A Or 柯婉嫻

Factors influencing delayed presentation with symptomatic breast cancer in Hong Kong Chinese women

Key Messages

1. Women knew about breast cancer symptoms, but atypical and painless presentation was more common among women delaying presentation.
2. Utilisation barriers included cost, uncertainty about referral pathways, competing priorities and embarrassment.
3. Education should emphasise atypical symptoms, a high cure rate and the need for early presentation.
4. Reduced cost and easy access to clinics would enhance early consultation.

Hong Kong Med J 2009;15(Suppl 4):S4-7

Centre for Psycho-Oncology Research and Training; Department of Community Medicine, The University of Hong Kong
WWT Lam, R Fielding
Department of Surgery, Kwong Wah Hospital
M Chan, A Or

HHSRF project number: 02030121

Principal applicant and corresponding author:
Dr Wendy WT Lam
Department of Community Medicine and Unit for Behavioural Sciences, The University of Hong Kong, Pokfulam, Hong Kong SAR, China
Tel: (852) 2819 9878
Fax: (852) 8855 9528
E-mail: wwtlam@hku.hk

Introduction

Delayed presentation of symptoms of breast cancer (BC) means that advanced, disseminated disease is more likely and treatment therefore less effective. This is one of the main contributors to mortality in BC.[1] Early treatment is associated with a much higher cure rate. It is therefore important to understand the reasons for delayed presentation and referral of symptoms for investigation. Several components of treatment delay have been noted, including patient-delay factors such as ignorance of symptom meaning, and delay between symptom detection and presentation, and doctor-delay factors such as diagnostic error and referral delay. Help seeking is influenced by illness cognitions, the way women make sense of their symptoms and the way they cope with the responses resulting from their symptom perceptions.[2,3] There are no such data for Hong Kong Chinese women. We sought to identify factors determining delayed presentation of BC symptoms in Hong Kong Chinese women.

Methods

This study was conducted from February 2005 to January 2006.

Study design

A grounded theory-based qualitative approach addressed four questions: (1) What information do women seek and attend to? (2) How do they interpret that information? (3) What decision rules do they use? (4) How do they justify their choices?

Sample

Following ethics committee approval, participants were recruited at surgery clinics in Kwong Wah Hospital, United Christian Hosptial, and Pamela Youde Nethersole Eastern Hospital from women consulting for self-identified BC symptoms. Chinese women, 21 years or older, residing in Hong Kong, and who could communicate in Cantonese were eligible. Women were excluded if they had a prior BC diagnosis, or if their breast abnormality was discovered through breast screening. Women interviewed were chosen, using theoretical sampling, to capture a wide range of perspectives.[4] Sample size was determined by data saturation, occuring with 37 women. Each woman participated in an in-depth, semi-structured interview, prior to their consultation, beginning with the question "please tell me how you decided to bring the particular breast problem to the attention of a doctor". Probing questions followed to encourage response elaboration. All of the interviews were tape-recorded.

Data analysis

All interviews were transcribed and then analysed using the grounded theory approach.[5]

Results

The Table summarises the characteristics of the participants. We derived a two-stage help-seeking decision model explaining the process of medical help-seeking decision by Chinese women with BC symptoms. The two stages were

Table . Personal and medical characteristics of the participants

Case	Age (years)	Martial status	Employment	Education level	Years of residence in Hong Kong	Type of symptoms	Duration of delay
1	44	Married	Full-time	Tertiary	>7	Breast lump	<1 week
2	52	Married	Housewife	Primary	>7	Breast lump	>6 months
3	48	Married	Part-time	Secondary	>7	Breast lump	<3 months
4	36	Married	Full-time	Secondary	4-7	Breast lump	>6 months
5	32	Married	Full-time	Primary	1-3	Breast lump	<1 week
6	44	Single	Full-time	Secondary	>7	Breast lump	<3 months
7	58	Married	Housewife	Primary	>7	Breast lump	>3 months
8	23	Single	Full-time	Secondary	>7	Breast lump	>3 months
9	78	Widowed	Retired	No formal	>7	Breast lump	>3 months
10	42	Married	Housewife	Secondary	1-3	Breast lump	<3 months
11	20	Single	Student	Tertiary	>7	Breast lump	>3 months
12	51	Married	Housewife	Secondary	>7	Breast lump	<1 week
13	48	Married	Full-time	Secondary	>7	Breast lump	<3 months
14	45	Married	Housewife	No formal	4-7	Breast lump	<1 week
15	46	Single	Unemployed	Secondary	>7	Breast lump	<1 week
16	47	Single	Full-time	Secondary	>7	Breast lump	>6 months
17	52	Single	Full-time	Primary	>7	Breast lump	<3 months
18	49	Married	Unemployed	Secondary	>7	Breast lump	>6 months
19	65	Married	Housewife	No formal	>7	Breast lump	>6 months
20	46	Widowed	Part-time	Secondary	<1	Breast lump	>3 months
21	35	Married	Housewife	Secondary	>7	Breast lump	<1 week
22	50	Married	Part-time	Primary	>7	Breast lump	<1 week
23	45	Single	Full-time	Secondary	>7	Breast lump	<1 week
24	52	Married	Part-time	Secondary	>7	Breast lump	<1 week
25	44	Divorced	Full-time	Secondary	>7	Nipple discharge	<3 months
26	70	Widowed	Retired	Primary	>7	Breast lump	>3 months
27	35	Single	Full-time	Secondary	>7	Breast lump	<1 week
28	44	Married	Housewife	Secondary	>7	Breast lump	<1 month
29	69	Married	Retired	Primary	>7	Breast lump	<1 week
30	56	Married	Part-time	Secondary	>7	Breast lump	<1 week
31	33	Married	Full-time	Secondary	>7	Breast lump	<3 months
32	81	Widowed	Housewife	No formal	>7	Breast lump	>6 months
33	54	Married	Full-time	Primary	>7	Breast lump	<1 week
34	42	Married	Full-time	Tertiary	>7	Breast lump	<3 months
35	40	Married	Full-time	Secondary	4-7	Breast lump	<1 month
36	47	Married	Full-time	Primary	>7	Breast lump	>6 months
37	21	Single	Full-time	Secondary	>7	Breast lump	>6 months

(1) symptom recognition and (2) service utilisation.

Symptom recognition

Three factors triggered symptom recognition—symptom interpretation, symptom progression, and social messages.

Symptom interpretation

- Interpretation influenced women's subsequent help-seeking behaviours: "*I didn't pay much attention to the lump. I just ignored it. But then recently, it was painful when I touched it. So I thought I shouldn't wait anymore. Then I went to see a doctor.*" (case 2, age 52, >6 months delay).
- If symptoms failed to match women's illness representation of BC, delay in seeking medical attention was more likely, suggesting women's symptom understanding was imprecise. Additionally, traditional Chinese medicine elements created ambiguity: "*I thought it's (the lump was caused by) re qi. So I took some cooling food....*" (case 6, age 44, <3 months delay).

Symptom progression

- For several women, symptom persistence triggered their consultation: "*(The lump) was still there every time I felt it. And it's the same as the first time I felt it. So I think it needs to be seen by a doctor.*" (case 20, age 46, >3 months delay)

Social messages

- Knowing someone who had cancer or breast disease that prompted women to attribute the symptom as a signal of health threat applied to both prompt and delaying appraisers. Women with relatives or friends who had BC promptly appraised the breast symptom as a threat. "*I am quite aware of BC as many of my friends had BC. So I know.*" (case 23, age 45, prompt seeker)
- Some women who initially dismissed the presence of symptoms were later prompted by others who had had BC: "*I didn't know what (the lump) meant.... Then my sister-in-law was diagnosed with BC. So I realised I was in trouble.*" (case 32, age 81, >6 months delay)
- News reports of the prevalence of BC heightened women's awareness of the potential seriousness of breast symptoms: "*I was really worried (when I felt a lump in the breast). I made an appointment...straight away... I read a lot about cervical cancer and breast cancer from the newspapers, also from TV adverts. So I was scared that I might have cancer.*" (case 5, age 32,

prompt seeker)

Service utilisation

Once the breast symptom was recognised as a potential health threat, women moved into the second stage and made the decision to seek medical care. Six triggers for medical help seeking emerged.

Fearing consequences of delayed help seeking

"*I am afraid of dying. ... I often seek medical help straight away whenever I am ill.*" (case 12, age 51, prompt seeker)

Perceived need to confirm the diagnosis

Closely related to this was the need for diagnostic confirmation: "*I decided to seek medical help because I want to have peace of mind. I need to know the diagnosis.*" (case 8, age 23, >3 months delay)

Physical symptom distress

Women experiencing prolonged physical symptom distress, particularly perceived interference with physical or daily activities, sought medical help promptly: "*I had to do housework and cook for my family. But I couldn't lift my hand up because the lump hurt. It affected my daily activities. So I need to seek help. Otherwise, I wouldn't go to see a doctor.*" (case 7, age 58, >3 months delay)

Lay referral system

For some women, the decision to seek medical help was taken by someone else. This is referred to as sanctioning and is a well-recognised feature of the lay referral system: "*My mum and my aunt pressed me to go and see a doctor. They told me that I must go to the doctor. ... I know I should seek medical help, but for some reason, I kept putting it off until my mum pushed me to do so.*" (case 8, age 23, >3 months delay)

Media prompts

Some women decided to seek medical attention for the breast symptom as a result of the current social marketing of BC awareness in Hong Kong: "*The information (about BC) on the advert sounds scary. It's about how one in 20 women would get BC. And I had a lump. So I decided to seek medical help.*" (case 21, age 35, prompt seeker)

Opportunistic help seeking

Many women, especially the delayers, presented the doctor with other health problems as their primary concern; the breast symptom was only presented as a secondary concern: "*I didn't seek medical help because it was not painful. I went to see a doctor later on for my chest pain. During the examination, the doctor felt the lump in my breast. So I told him.*" (case 18, age 49, >6 months delay)

Fear of cancer diagnosis

For some women, the possibility of having BC was too frightening, leading them to delay seeking medical attention in order to avoid confronting the bad news: "*I had been struggling for 2 to 3 months whether to go to the doctor or not. I was so frightened of finding out the truth.*" (case 8, age 23, >3 months delay)

Inaccessibility to health services

Unfamiliarity with the medical care system prevented some women from utilising the health service. Older women and new immigrants were particularly likely to have difficulty accessing health services: "*I know I had to see a doctor. But I didn't know where to go. So I waited till the next follow-up appointment at the diabetic clinic. Then I told the doctor.*" (case 26, age 70, >3 months delay)

Financial constraints

Limited household income and health care costs contributed to utilisation delay: "*I can't afford to see a doctor. I live on the government allowance. I don't have money to seek medical help. My daily costs are HK$70. So where am I going to find money to see a doctor? So I have to wait till the follow-up appointment (for another medical concern).*" (case 26, age 70, >3 months delay)

Competing life priorities

Delayers tend to prioritise their other social duties over their own health: "*I have two daughters who are at school. I need to take them to school and help them with their homework. So I thought I should wait till the summer holiday to go to see a doctor.*" (case 10, age 42, <3 months delay)

Embarrassment about having a breast examination

Women who delayed presentation viewed their breasts as private and were reluctant to be examined by a physician, especially a male physician: "*I went to the follow-up appointment to get medications for my hypertension. It was a male doctor. So I didn't tell him about my lump. It's too embarrassing. I didn't want him to look at my breasts. Then I met a female doctor in the following appointment. So I told her about my lump.*" (case 9, age 78, >3 months delay)

Discussion

Symptom interpretation, the initial and most important step in the process of symptom recognition, is largely constructed from pre-existing lay knowledge of BC symptoms. When the symptom is incongruent with women's lay knowledge of BC, women are more likely to attribute minimal symptom significance and delay seeking medical care. Chinese women make sense of breast symptoms using both traditional Chinese (the balance of yin and yang and *qi*) and western (pain associated with illness and injury) decision rules, which might possibly confuse their symptom attributions, resulting in different causes for appraisal delay.

High fear messages can discourage some women and should be avoided in local health education campaigns.

Instead, the favourable prognosis following early detection should be emphasised. Social messages sent via the media facilitate women's prompt utilisation of health services on detecting a symptom.

Acknowledgements

This study was supported by the Health and Health Services Research Fund (HHSRF: 02030121), Food and Health Bureau, Hong Kong SAR Government. The investigators would like to acknowledge the work of Ella YY Ho and Rachel Leung for transcription input, and Miyako Tsuchiya who contributed significantly to the data analysis.

References

1. Richards MA, Westcombe AM, Love SB, Littlejohns P, Ramirez AJ. Influence of delay on survival in patients with breast cancer: a systematic review. Lancet 1999;353:1119-26.
2. Ramirez AJ, Westcombe AM, Burgess CC, Sutton S, Littlejohns P, Richards MA. Factors predicting delayed presentation of symptomatic breast cancer: a systematic review. Lancet 1999;353:1127-31.
3. Facione NC, Giancarlo CA, Chan L. Perceived risk and help-seeking behavior for breast cancer. A Chinese-American perspective. Cancer Nurs 2000;23:258-67.
4. Creswell JW. Qualitative inquiry and research design: choosing among five traditions. Thousand Oaks, CA: Sage; 1998.
5. Strauss A, Corbin J. Basics of qualitative research: techniques and procedures for developing grounded theory. Thousand Oaks, CA: Sage; 1998.

SWC Chan 陳懇慈
WT Chien 錢惠堂
S Tso 左思賦

Provision and evaluation of a suicide prevention and management programme by frontline nurses in Hong Kong

Key Messages

1. An education programme to enhance the knowledge, attitudes and competence of nurses in patient suicide prevention in general hospitals was evaluated. There were no significant differences between the study and control groups for any of the outcome measures.
2. Nursing manpower, practical guidelines, interdisciplinary collaboration and physical structure in the ward, which can prevent nurses from carrying out their roles and responsibilities, need to be addressed.
3. Administrators have to bring about changes in nurses' existing knowledge, skills, and attitudes.
4. A continuous cycle of education is needed for new skills and knowledge to be internalised. Ongoing evaluation of the programme could facilitate improvements.

Hong Kong Med J 2009;15(Suppl 6):S4-8

The Nethersole School of Nursing, Faculty of Medicine, The Chinese University of Hong Kong
SWC Chan, WT Chien
Castle Peak Hospital
S Tso

HHSRF project number: 02030461

Principal applicant and corresponding author:
Prof Sally WC Chan
The Nethersole School of Nursing, Faculty of Medicine, The Chinese University of Hong Kong, Shatin, NT, Hong Kong SAR, China
Tel: (852) 2609 6222
Fax: (852) 2603 5269
E-mail: sallychan@cuhk.edu.hk

Introduction

Health care professionals should increase awareness about patient suicides in hospitals. A retrospective study in Hong Kong from 2000 to 2002 reported 166 suicidal attempts in 26 public hospitals, in which 34 patients died.[1] Frontline nurses play a crucial role in suicide prevention and management; it is challenging for them to provide care for patients with suicidal ideation or after suicidal attempts. Nurses may feel frustrated, inadequate, and unsure whenever they fail to help these patients.[2] In England, education for nurses achieved positive results.[3] It is anticipated that an education programme can also enhance local nurses' knowledge, attitude, and competence about suicide prevention and management.

Aims and objectives

1. To evaluate an education programme for frontline nurses on patient suicide prevention and management.
2. To evaluate the effects of the education programme on nurses' knowledge, attitude, and competence for dealing with patients (who have attempted suicide or have suicidal ideation) and their family members.
3. To examine the strengths and weaknesses of the programme from the participants' perspectives.
4. To enhance nurses' knowledge and competence related to suicide prevention and management.

Methods

Study design

The study was conducted in two general hospitals from December 2004 to June 2006. We used an evaluative design that incorporated quantitative and qualitative methods to assess outcomes and processes. The content of the education programme was based on learning needs assessment and literature review.[3,4] The programme consisted of 8.5 hours of learning activity. Teaching and learning approaches were developed based on principles of reflective learning.[5]

Sample size

A total of 110 registered nurses from medical and surgical units were randomly assigned to the study (n=54) and control (n=56) groups. Their demographics are presented in Table 1. There were no dropouts from the study. A purposive sample was recruited for the focus group interviews: the process evaluation interviews (three focus groups with 24 participants) and the outcome evaluation interviews (three focus groups with 18 participants).

Outcome measures

Participants in both groups were assessed before (pre-test) and immediately (post-test 1), 3 months (post-test 2), 6 months (post-test 3) after intervention, using four instruments: the Suicide Opinion Questionnaire (SOQ), the test on knowledge of management of suicide, the nursing competency in suicidal prevention and management, and the nurses' stress and coping in caring for suicidal patients.

Table 1. Demographics of the participants

Demographics	Study group (n=54)	Control group (n=56)	P value
	No. (%) of participants		
Gender			χ^2=1.007, P=0.316
Male	6 (11.1)	10 (17.9)	
Female	48 (88.9)	46 (82.1)	
Age range (years)			χ^2=4.014, P=0.134
21-30	17 (31.5)	27 (48.2)	
31-40	28 (51.9)	19 (33.9)	
41-60	9 (16.7)	10 (17.9)	
Hospital			χ^2=0.00, P=1.00
Hospital A	27 (50.0)	28 (50.0)	
Hospital B	27 (50.0)	28 (50.0)	
Clinical specialty			χ^2=0.01, P=0.919
Medical	40 (74.10)	41 (73.20)	
Surgical	14 (25.90)	15 (26.80)	
Participation in any continuing education related to suicide prevention in past 2 years			χ^2=0.46, P=0.497
Yes	7 (13.0)	5 (8.90)	
No	47 (87.0)	51 (91.1)	
	Mean±SD (range)		
Years of experience	10.03±6.91 (0.25-28)	9.07±6.86 (0.25-29)	t=0.731, P=0.466, df=108
No. of suicidal patients cared in past 12 months	3.00±4.11 (0-20)	2.79±4.67 (0-30)	t=0.255, P=0.799, df=108
Duration (hours) of taking care of suicidal patients in past 12 months	16.42±32.79 (0-184)	24.22±49.72 (0-240)	t=-0.968, P=0.335, df=108

Focus group interviews

Process evaluation interviews were conducted immediately after the programme to identify its strengths and limitations from the perspectives of the participants. Outcome evaluation interviews were conducted 6 months after the programme to assess the participants' competence in caring for patients with suicidal intent, and to identify factors affecting the use of such knowledge in practice.

Results

Outcome measures

Table 2 shows the mean and standard deviation (SD) of all outcome measures for the two groups. Table 3 compares the four outcome measures between the two groups. There was no significant difference between the two groups at baseline. The interaction terms (between group × time) were not significant for any of the outcome measures. No treatment effect was detected for any of the outcome variables. However, significant time effect was found for the SOQ total scores (P=0.001) and subscales (social disintegration, P=0.009; personal defect, P=0.008; the competency checklist, P=0.014; and the stress and coping scale, P=0.045). Both groups showed improvement with respect to all post-test 1 scores, which then gradually declined in subsequent tests.

Process evaluation: evaluation form

The participants gave positive feedback about the programme. They agreed that its objectives were appropriate and achieved, and had enhanced their knowledge, attitudes and skills in caring for suicidal patients and their families, which included confidence and competency in practice. They also claimed that the programme helped increase their alertness with regard to suicide prevention. Topics related to assessment protocol, intervention, case studies, sharing of experience and information about suicide were considered the most useful. Many participants suggested that the programme be extended to a week and include more discussion, case sharing, and real-life examples. Some wanted more skills practice using role plays and videos.

Process evaluation: focus group interviews

The participants agreed that sessions on suicide theories, statistics, 'myths and facts' and assessment of suicide risks were useful, and a 'no suicide' contract was particularly interesting. Case sharing was more helpful than theory to change the mindset of general nurses, and helped their learning in the management of similar cases. Role plays were similarly useful and interesting. Questions posed in the research questionnaires reinforced positive values and concepts. The handouts, notes and community resources information were useful.

The participants agreed that the programme met their expectations, and regarded case sharing as helpful to change mindsets and attitudes towards their patients. Many participants mentioned that the programme had enhanced their knowledge of suicidal risk factors, and helped increase their awareness of patients with suicidal intent. General nurses play an important role in coordination among disciplines and a multidisciplinary approach is essential in the care of suicidal patients. All participants agreed that the duration of the programme should be longer, which concurred with written comments in the evaluation form. They also recommended continuous learning and updates on the topic and that suicide prevention education not be confined to just a one-off course.

Table 2. Means and SD of all outcome measures of the study and control groups

Outcome measures	Mean (SD)			
	Pre-test	Post-test 1	Post-test 2	Post-test 3
Knowledge on management of patients with suicidal risk				
Study	5.00 (1.57)	5.54 (1.79)	5.61 (1.47)	5.44 (1.73)
Control	5.34 (1.81)	5.27 (1.79)	5.41 (1.85)	5.16 (2.07)
Suicide Opinion Questionnaire				
Total score				
Study	155.5 (10.90)	161.5 (13.60)	159.0 (15.23)	159.1 (13.71)
Control	155.2 (12.26)	158.8 (16.85)	157.8 (16.75)	159.8 (16.10)
Acceptability				
Study	27.74 (5.42)	28.85 (6.03)	28.59 (6.03)	28.70 (5.53)
Control	27.98 (4.67)	28.73 (5.75)	28.55 (6.18)	28.77 (6.53)
Perfect factual knowledge				
Study	29.19 (3.31)	29.20 (3.33)	29.83 (4.11)	29.63 (3.61)
Control	28.73 (3.88)	29.96 (5.76)	29.46 (3.80)	29.91 (4.12)
Social disintegration				
Study	32.46 (3.97)	34.72 (3.52)	33.96 (4.26)	33.83 (4.40)
Control	32.48 (4.16)	33.09 (4.72)	33.07 (5.13)	33.63 (5.00)
Personal defect				
Study	37.37 (3.28)	38.93 (4.30)	37.57 (3.87)	37.85 (3.53)
Control	37.80 (3.83)	38.71 (4.89)	38.16 (3.65)	38.71 (3.07)
Emotional perturbation				
Study	28.72 (2.62)	29.78 (3.04)	29.04 (3.43)	29.04 (3.06)
Control	28.18 (3.24)	28.27 (3.28)	28.55 (5.24)	28.79 (4.18)
Checklist on nursing management of patient with suicidal precaution				
Study	27.49 (9.20)	31.03 (5.97)	26.64 (11.27)	24.38 (13.56)
Control	27.60 (10.95)	28.71 (10.22)	29.17 (9.19)	27.21 (11.09)
Nurse's stress and coping in caring for a suicidal patient				
Study	16.29 (3.33)	16.04 (3.35)	15.27 (3.19)	15.64 (3.22)
Control	16.07 (2.72)	15.27 (2.51)	15.32 (2.96)	15.32 (3.06)

Table 3. Comparison of the four outcome measures between the study and control groups

Outcome measures	Baseline scores	Repeated-measures ANOVA		
		Group	Time	Group x time
Knowledge on management of patients with suicidal risk	T=-1.049, df=108, P=0.296	F(1,108)=0.147, P=0.702	F(3,106)=1.378, P=0.254	F(3,106)=1.409, P=0.244
Suicide Opinion Questionnaire				
Total score	T=0.137, df=108, P=0.891	F(1,108)=0.134, P=0.715	F(3,106)=5.835, P=0.001	F(3,106)=0.861, P=0.464
Acceptability	T=-0.25, df=108, P=0.803	F(1,108)=0.002, P=0.969	F(3,106)=1.479, P=0.225	F(3,106)=0.048, P=0.986
Perfect factual knowledge	T=0.658, df=108, P=0.512	F(1,108)=0.008, P=0.928	F(3,106)=1.598, P=0.194	F(3,106)=1.022, P=0.386
Social disintegration	T=-0.025, df=108, P=0.98	F(1,108)=0.997, P=0.320	F(3,106)=4.101, P=0.009	F(3,106)=2.190, P=0.093
Personal defect	T=-0.637, df=108, P=0.526	F(1,108)=0.508, P=0.478	F(3,106)=4.118, P=0.008	F(3,106)=0.686, P=0.563
Emotional perturbation	T=0.967, df=108, P=0.336	F(1,108)=1.890, P=0.172	F(3,106)=1.211, P=0.309	F(3,106)=1.373, P=0.255
Checklist on nursing management of patient with suicidal precaution	T=0.273, df=101, P=0.786	F(1,79)=0.205, P=0.652	F(3,77)=3.765, P=0.014	F(3,77)=1.986, P=0.123
Nurse's stress and coping in caring for a suicidal patient	T=0.701, df=93, P=0.485	F(1,87)=0.319, P=0.573	F(3,85)=2.789, P=0.045	F(3,85)=1.092, P=0.357

Outcome evaluation

After the education programme, participants regarded themselves as more competent in assessing, communicating with, and helping suicidal patients. Subjectively they felt their assessment skills had improved and that they had put theory into practice. Because of enhanced knowledge, they had more confidence in caring for and communicating with suicidal patients. The programme helped expose myths they previously had about suicide, and led to changes in their attitudes.

Among the most frequent barriers to caring for suicidal patients were insufficient time and staff. All participants commented on nursing shortages in the hospitals, and expressed frustration that they did not have the time to assess and observe patients at risk. There was a lack of support from senior management in providing psychological care for this group of patients. The physical environment of wards made observation and care difficult. Protocols were useful to guide care.

Discussion

This study evaluated an education programme to enhance

the knowledge, attitudes and competence of nurses in patient suicide prevention. The participants had spent an average of 16.42 (SD, 32.79) hours taking care of patients at risk of suicide in the previous 12 months. Therefore, it was not uncommon to encounter such patients.

Contrary to our expectations, the results showed no significant differences between the study and control groups for any of the outcome measures. Both groups showed improvement in all outcome measures across time between the pre- and post-test 1, but the scores gradually declined thereafter. Several factors could have influenced the results. Previous studies used a qualitative or a one-group pre-post test design,[4] whereas the present study used a control group.

The duration of the education programme might have been too short to produce a statistically significant difference between the two groups. Furthermore, as the participants in both groups worked in the same venues, communication between them was inevitable. Although we monitored the control group to ensure that they did not participate in any formal learning on the topic, informal learning (reading articles or books related to suicide prevention and management) could not be controlled. The motivation of participants was high. The control group filled in four sets of questionnaires four times, indicating interest in the subject of the study. They might have already been aware of the problem of suicide and willing to learn more. The questionnaires might have stimulated them to think more about the issues, search for answers for the test or read more about the subject, thus leading to improvement in outcome measures.

Focus group interviews provided a better understanding of the intervention. Process evaluation interviews suggested that the programme content was essential and appropriate. The participants realised the need for continuous learning. They suggested lengthening the duration of the course and elaboration on topics such as handling aggression. These topics reflected their learning needs and concerns in clinical practice. The participants encountered more often patients with aggressive behaviour than in the past.

From outcome evaluation interviews, the participants considered that the education programme enhanced their knowledge, attitudes, confidence, and competence in the topics. The knowledge gained from the programme helped expose myths related to suicide, thus enabling the nurses to change attitudes towards the care of this patient group. With increased knowledge, they had more confidence in taking care of them.

The participants' verbal accounts revealed a change in attitudes towards suicide prevention and management. The findings of this study supported the importance of a positive attitude towards developing greater awareness of the problem of suicide, willingness to talk to patients, and improved assessment skills.

The reflective learning method used in the programme was appreciated, and was similar to a previous study showing that reflective discussion was an appropriate learning method for experienced nurses.[4] Adults learn by relating new knowledge to their personal experience and gain new perspectives from reflection.[5] Participants suggested that more discussions and role plays be included in future presentations of the programme.

The qualitative data revealed the particular concerns of nurses relating to the care of this patient group, which could be of relevance to future practice. Comments about support from senior staff members, nursing shortages, organisation of care and the physical environment reflected the difficulties they encountered when caring for patients at risk of suicide. Although suicide prevention and management is an important topic, nurses could not get support from the senior management in attending education programmes. In clinical areas, there was inadequate support for providing care to patients with suicidal intent. The social system and organisational factors were found to influence staff self-perceived ability to implement changes.

The physical structure of a general ward differs from that of a purpose-built mental health unit specially designed to take safety into account and enable observation of patients at high risk of suicide. This can pose problems of implementing common interventions such as the regular observation of patients for suicidal behaviour difficult. The crowded ward environment might also make it difficult to provide a place in which patients can privately express their feelings.

This study assessed only those who were willing to participate. The results might not be generalisable to those who refused to do so. We shortened the duration of the education programme, which may have influenced outcomes. This study measured only subjective attitudes and competency, not actual performance.

Implications

Future programmes could strengthen the content concerning watchfulness for potentially dangerous articles, communication and counselling for suicidal patients and their relatives and handling of their aggressive behaviour. Skills related to working and communicating in multidisciplinary teams in the care of suicidal patients could also be strengthened. Interactive learning methods in the form of role plays, practical sessions and case discussion are conducive to learning.

The duration of education needed to produce behavioural changes needs to be further studied. Continuous education is needed if new skills and knowledge are to be internalised, and changes made. Ongoing evaluation of the programme is needed to facilitate improvement.

There is a need to review the organisation of care and policies related to the care of suicidal patients in hospitals. Adequate staffing, improved communication with specialists in mental health services, support from senior colleagues and those in other disciplines, protocols to guide care and practice are all necessary. Furthermore, modification of care models and the physical environment are needed to facilitate appropriate care to this patient group from nurses.

Acknowledgements

This study was supported by the Health and Health Services Research Fund (#02030461), Food and Health Bureau, Hong Kong SAR Government. We thank the hospitals and nurses that participated in this study.

References

1. Ho TP, Tay MS. Suicides in general hospitals in Hong Kong: retrospective study. Hong Kong Med J 2004;10:319-24.
2. Valente S, Saunders JM. Barriers to suicide risk management in clinical practice: a national survey of oncology nurses. Issues Ment Health Nurs 2004;25:629-48.
3. Holdsworth N, Belshaw D, Murray S. Developing A&E nursing responses to people who deliberately self-harm: the provision and evaluation of a series of reflective workshops. J Psychiatr Ment Health Nurs 2001;8:449-58.
4. World Health Organization. Multi-site intervention study on suicidal behaviours –SUPRE-MISS: the Protocol 2000. Geneva: Department of Mental health and Substance Dependence, WHO.
5. Wong FK, Loke AY, Wong M, Tse H, Kan E, Kember D. An action research study into the development of nurse as reflective practitioners. J Nurs Educ 1997;36:476-81.

SSC Hui 許世全
J Woo 胡令芳
T Kwok 郭志銳

Evaluation of energy expenditure and cardiovascular health effects from Tai Chi and walking exercise

Key Messages

1. A 12-week Tai Chi or walking exercise intervention produced significant and similar beneficial effects on body composition, aerobic fitness, muscular fitness, fasting blood glucose, resting metabolic rate, and perceived health in middle-aged Chinese.
2. While Tai Chi and walking both elicited significant cardiorespiratory responses and energy expenditure to the moderate intensity level, walking exercise elicited about 46% higher metabolic cost than Tai Chi exercise.

Hong Kong Med J 2009;15(Suppl 2):S4-7

Department of Sports Science and Physical Education, The Chinese University of Hong Kong
SSC Hui
School of Public Health, The Chinese University of Hong Kong
J Woo
Division of Geriatrics, Department of Medicine & Therapeutics, School of Public Health, The Chinese University of Hong Kong
T Kwok

HHSRF project number: 02030511

Principal applicant and corresponding author:
Prof Stanley Sai-chuen Hui
Department of Sports Science and Physical Education, The Chinese University of Hong Kong, Shatin, NT, Hong Kong SAR, China
Tel: (852) 2609 6081
Fax: (852) 2603 5781
E-mail: hui2162@cuhk.edu.hk

Introduction

Other than cancer, cardiovascular diseases (CVD) account for major mortality and morbidity rates in Hong Kong. Increasing energy expenditure through regular exercise has been found to lower the risk of CVD and to control hyperlipidaemia and obesity. A cross-sectional survey revealed that Tai Chi (TCC) and walking exercises (WLK) are widely practised by Hong Kong citizens.[1] However, there have been limited studies to compare the health benefits of the two.

An influential medical report confirmed that daily accumulation of 30 minutes of moderate physical activity significantly lowered the risk of developing many chronic diseases. Some studies demonstrated various health benefits from regular WLK. The most recent study by Murphy et al[2] provided an excellent example. This reported that in a 6-week WLK programme (5 days per week), a single bout of continuous 30 minutes of WLK per day yielded similar health benefits to three 10-minute walk per day.

Tai Chi is an ancient form of Chinese fitness exercise. A number of studies have investigated the positive health effects of TCC for patients,[3] as well as for healthy individuals.[4] Such health benefits include improvement in: aerobic fitness and energy metabolism, muscular strength and balance, and mental control. Compared to WLK, it is intuitively perceived to be of lower exercise intensity and metabolic cost. Surprisingly, Lan et al[4] reported that the exercise intensity of a typical session of TCC (24 minutes Yang style) exceeded 70% of maximal heart rate. However, the energy cost of this single bout of TCC has not been investigated. Tai Chi and WLK seem to provide similar benefits but have not been compared simultaneously except in one study. Heart rate, blood pressure, and urinary catecholamine changes for TCC and WLK at 6 km/h are similar. However, currently there are no scientific data in this respect on Hong Kong Chinese population. Results from our study would therefore be valuable for practitioners to provide quantifiable weight control prescriptions for obese individuals, as well as for those who need to improve cardiovascular health.

Methods

This study was conducted from September 2004 to August 2006.

Subjects

A total of 374 sedentary, middle-aged subjects (men and women) from large housing estates in Shatin (New Territories, Hong Kong) who had no known cardiovascular and pulmonary diseases, neurological disorder, or musculo-skeletal disorders were recruited. Informed consent was obtained from participants prior to recruitment. Subjects were then randomly assigned into either a TCC, WLK, or control (CTL) group. To avoid contamination of recruits from excessive numbers in any one of the nine geographical locations, subjects were randomised by locations using a simple random drawing procedure. As a result, three locations were assigned TCC, three for WLK and the remaining three locations as control. For each treatment group, the minimal sample size was pre-determined at not less than 100, resulting in a total of not less than 300. Meanwhile, in order to match the age and gender distribution among the three groups, an effort was made to recruit

approximately 10 subjects of each gender and for each 5-year age-group between the ages of 36 and 60 years.

Exercise intervention

After the initial measurements of resting and exercise metabolic costs and CVD risks, the TCC and WLK groups were prescribed a 12-week training programme, with 5 days of exercise per week (led by qualified instructors for 3 days, and on their own for 2). A modified 32 Yang style TCC was selected. For the WLK group, subjects were required to walk 5 times per week. Upon completion of the 12-week exercise intervention programmes, all the tests were repeated. For the control group, the pre- and post-exercise assessments were conducted in the same way, however, there was no exercise intervention.

Measurement of energy expenditure

All subjects were instructed to lie on a bed for 20 minutes in an environment with a comfortable temperature and humidity. Resting metabolic rate, in terms of oxygen consumption (VO_2 in mL/kg body weight/min), and energy expenditure (KCal in KCal/min), were measured by the Cosmed K4b2 metabolic measuring system. The lowest metabolic value for a continuous 10-minute period was taken to be the resting metabolic rate. To compare the metabolic cost between TCC and WLK, another 30 TCC practitioners of similar age as the intervention participants were recruited to perform 10 min of TCC, 10 min of WLK in self-selected pace, and 10 min of WLK at a controlled heart rate similar to those encountered with TCC. Each form of exercise was performed three times in a random order. Metabolic cost, in terms of VO_2, KCal, and heart rate (HR) were measured using the Cosmed K4b2 analyser.

Measurement of cardiovascular disease risks

These risk factors were determined by blood tests (total, low- and high-density lipoprotein cholesterols, triglycerides, fasting blood glucose). Body composition was measured by bioelectrical impedance analysis. Criteria of CVD risks were adopted from the American Heart Association and the American College of Sports Medicine. Cardio-respiratory fitness, in terms of VO_2max, was measured using a symptom limited treadmill exercise test. Subjects were also required to answer a 'typical 1-week food frequency' questionnaire for diet analysis.

Other measures

Perceived health status was measured by a Chinese version Short-form (12 items) Health-related Quality of Life questionnaire. Six months after the intervention, exercise compliance after the cessation of the 12-week exercise training programme was enquired into by a questionnaire.

Statistical analysis

Age-adjusted repeated measures multivariate analysis of covariance, and subsequent univariate analysis of covariance and Scheffee tests were performed to examine changes in outcome measures between TCC, WLK and CTL groups.

Results

Descriptive statistics

Upon recruitment, there were 129 TCC, 121 WLK and 124 CTL participants. Due to voluntary drop-out and elimination of subjects with low attendance (<70%) in classes, the final sample size for analyses entailed 104 TCC (completion rate 81%), 91 WLK (completion rate 75%), and 121 CTL (completion rate 98%) participants.

Body composition

Statistically significant reductions in body composition measures (body weight, body mass index [BMI], waist circumference, hip circumference, waist:hip ratio, % body fat, and sum of skinfolds) for both WLK men ($P<0.05$ to $P<0.001$) and women ($P<0.01$ to $P<0.001$) were noted. Similar findings were observed for waist circumference, waist:hip ratio, % body fat, and sum of skinfolds in both TCC men ($P<0.001$) and women ($P<0.001$). In addition, TCC men had significant body weight and BMI reductions ($P<0.001$), while the reductions for TCC women were not significant. By contrast, most of the body composition measures in the CTL group increased slightly, although not to a statistically significant extent. Waist ($P<0.01$) and hip ($P<0.001$) circumference, and % body fat ($P<0.05$) of CTL men increased significantly. Sum of skinfolds in CTL women decreased slightly ($P<0.05$). The pre-post changes in BMI for the subjects are shown in Figure 1.

Physical fitness

For men, items that showed improvements post exercise were: back lift strength ($P<0.01$ for TCC and $P<0.01$ for WLK); right leg balance ($P<0.05$ for WLK only); curl-up ($P<0.001$ for both TCC and WLK); and sum of sit-and-reach ($P<0.001$ for both TCC and WLK). For women, corresponding items showing improvements were: back lift strength ($P<0.001$ for WLK only); sum of balance test ($P<0.01$ for WLK only); curl-up ($P<0.01$ for TCC and $P<0.05$ for WLK); and sum of sit-and-reach ($P<0.001$ for TCC, $P<0.01$ for WLK). For CTL men, diastolic blood

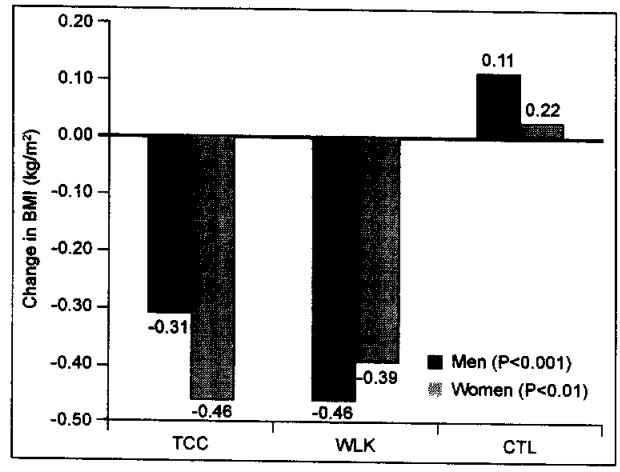

Fig 1. Mean changes in body mass index (BMI) in Tai Chi (TCC), walking exercises (WLK) and control (CTL) subjects

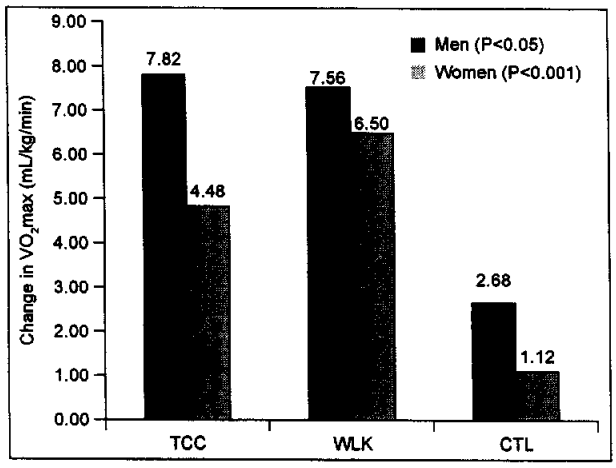

Fig 2. Mean changes in VO_2max in Tai Chi (TCC), walking exercises (WLK) and control (CTL) subjects

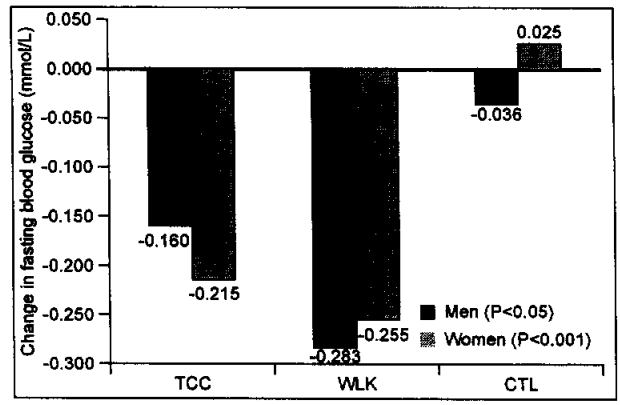

Fig 3. Mean changes in fasting blood glucose in Tai Chi (TCC), walking exercises (WLK) and control (CTL) subjects

pressure (DBP) (P<0.01) and leg lift (P<0.01) decreased slightly, whereas arm lift, back lift and curl-up increased slightly (P<0.01). For CTL women, DBP (P<0.05), arm lift (P<0.01) and shoulder lift (P<0.05) decreased slightly, but back lift (P<0.001) and curl-up (P<0.05) increased slightly. Post-hoc pairwise comparison suggests that both TCC and WLK improved hamstring flexibility compared to CTL as reflected by changes in sit-and-reach scores. However, post-hoc comparison showed non-significant difference between TCC and WLK subjects.

Aerobic fitness

The VO_2max for both exercise groups improved significantly after the exercise (P<0.001 for all TCC and WLK subjects) when compared to the CTL group (Fig 2). Post-hoc comparison showed non-significant difference between TCC and WLK participants.

Resting energy expenditure

There were significant increases in resting energy expenditure (REE)–VO_2 (mL/min/kg) [P<0.001] and REE-KCal (KCal/min) [P<0.01] post exercise, in both TCC and WLK men in comparison to CTL men. No such trend was observed for women.

Blood profiles

In both TCC and WLK men and women, fasting blood glucose levels decreased significantly post exercise (P<0.001, Fig 3).

Dietary intakes

In both men and women, the KCal intake from all of carbohydrates, fat and protein showed no significant differences post exercise, except that for TCC women KCal intake from protein was higher (P<0.01).

Changes in perceived health

The SF-12 questionnaire showed that there was generally an improvement of perceived health status in both TCC and WLK subjects. No such trend was observed for the CTL subjects.

Six-month maintenance

In the respective TCC and WLK subjects, 64% and 77% of the subjects continued to perform their TCC and WLK exercises in the ensuing 6 months, 60% and 68% did so in the ensuing month, and 53% and 65% did so in the ensuing week. Regarding the respective mean frequencies of exercise being performed per week, they were: 2.5 and 3 times in the ensuing 6 months, 2.1 and 2.8 times in the ensuing month, and 2.2 and 2.8 times in the ensuing week.

Metabolic cost

To evaluate the metabolic cost of TCC and WLK, 30 more TCC practitioners were recruited to perform three types of exercises in a randomised order: (1) simplified 33 Yang style TCC performed at a regular pace; (2) brisk walking (BW) at a self-selected pace (WLK-BW); and (3) walking under controlled heart rate (HRC) similar to the TCC exercise (WLK-HRC). Repeated measures analysis of variance revealed that VO_2, HR, ratio of work metabolic rate to resting metabolic rate (MET) and energy expenditure (EE) in the WLK-BW group were significantly greater than those in the TCC and WLK-HRC (P<0.05, Table) groups, whereas no differences were noted between the TCC and WLK-HRC (P>0.05) groups. The exercise HRs for TCC, WLK-BW, and WLK-HRC were about 56%, 65%, and 57% of maximum, respectively. These figures revealed that WLK-BW produced approximately a 46% higher metabolic cost than TCC. Post hoc comparison showed non-significant difference between TCC and WLK-HRC groups. No interaction was found for women. Notably, TCC, WLK-BW, and WLK-HRC elicited significant cardiorespiratory and EE responses to the moderate intensity exercise.

Discussion

This study is perhaps the first to provide a comprehensive comparison of health and fitness in middle-aged, Chinese TCC and WLK subjects. Encouragingly, both 3-month TCC and WLK exercise training produced similar levels of weight reduction, improvement in blood profile and physical fitness, and significantly increased the resting metabolic rate. Both TCC and WLK resulted in reductions

Table. Cardiorespiratory and energy expenditure responses in Tai Chi (TCC), brisk walking (WLK-BW), and walking under controlled heart rate (WLK-HRC) subjects

Measurement*	TCC	WLK-BW	WLK-HRC
VE (mL/min)	18.6 ± 4.1	29.3 ± 7.4†	21.7 ± 5.4
VO_2 (mL/min)	681.9 ± 183	993 ± 279.8†	731.6 ± 238.6
VO_2 (mL/kg/min)	11.3 ± 2.5	16.6 ± 4.2†	12.2 ± 3.7
EE_{total} (KCal)	32.8 ± 8.9	48.1 ± 13.4†	34.8 ± 11.3
EE (KCal/min)	3.2 ± 0.9	4.8 ± 1.3†	3.5 ± 1.1
METS	3.24 ± 0.7	4.7 ± 1.2†	3.5 ± 1.0
$HR_{exercise}$ (bpm)	98 ± 16	114 ± 16†	100 ± 15
RER	0.82 ± 0.09	0.84 ± 0.07†	0.8 ± 0.09
RPE	10.1 ± 1.1	11.2 ± 1.4	10.3 ± 1.0

* VE (mL/min) denotes minute ventilation, VO_2 (mL/min) minute oxygen uptake, VO_2 (mL/kg/min) minute oxygen uptake relative to each kg of body weight, EE_{total} (KCal) total energy expenditure for 10 min of exercise, EE (KCal/min) total energy expenditure per minute, METS the ratio of work metabolic rate to the resting metabolic rate, $HR_{exercise}$ (bmp) heart rate in exercise (beats per minute), RER respiratory exchange ratio, RPE rate of perceived exertion on a 6-20 scale

† P<0.05, TCC versus WLK-BW, WC versus WLK-HRC

of approximately 1 kg in body weight and 2.5 cm in waist circumference in men. In women, corresponding reductions were 0.33 kg after TCC and 0.87 kg after WLK and about 5 cm of waist circumference for both forms of exercise. Similar significant reductions in % body fat and sum of skinfolds were also noted after TCC and WLK in both men and women. In all three groups, some muscular strength tests and curl-up endurance improved in both men and women, however there was no significant interaction. These improvements were probably due to enhanced experiences compared to the pre-exercise status. However, some muscular strength tests in CTL subjects revealed significant decreases (leg lift in men, and arm and shoulder lifts in women). Only the interaction of sit-and-reach flexibility was significant, which suggested that both TCC and WLK improved hamstring flexibility compared to CTL activity. Regarding aerobic fitness in men, after TCC VO_2max improved 22% and after WLK it improved 21%. In women, corresponding figures were 15% after TCC and 20% after WLK. Similar results were noted for changes in fasting blood glucose. More importantly, other than the physiological parameters described above, perceived health status also improved significantly (24-29% after WLK, and 13-14% after TCC). Moreover, 60% to 70% of the exercise participants continued to practise regular exercise training 6 months after the intervention.

Regardless of the similar levels of health improvement from TCC and WLK, the mean exercise HR was 33% higher in WLK than TCC in men, and 34% higher in women. The experiment in metabolic cost comparison revealed that WLK elicited 46% higher VO_2 and EE. When exercise intensity and safety is a concern, TCC appears more desirable than WLK, since it elicits lower metabolic demands but yields similar levels of health benefits. Why TCC produces similar health and fitness benefits at a lower metabolic demand compared to WLK is not known. However, it is the belief of Chinese martial arts practitioners that there is an internal energy called 'qi' that circulates inside the body when practising Tai Chi. The slow and regular breathing technique combined with slow but steady muscular movement is believed to produce 'qi' that stimulates long-term changes in physical fitness.

Although TCC elicits lower metabolic demand, the present study recorded that it produced 56% of age-predicted HR max and 3.3 METs (VO_2=11.5 mL/kg/min) of exercise intensity, which is considered to be an aerobic exercise at a moderate intensity. Li et al[5] reviewed 31 TCC studies and found that nine of them were reported to entail moderate intense exercise, with no more than 55% of VO_2max. The present study recorded that the exercise HR following TCC ranged from 86 to 98 bpm, which are fairly consistent with the findings in a previous study recording a peak HR of 95-98 bpm after TCC.[6]

Although the present study reports a number of significant health improvements from TCC and WLK, arguably the magnitude of improvement was small. It is important to note that, in both the TCC and WLK interventions, the exercise volume was not large; the active exercise time was only 30 minutes per session, 3 times a week and its intensity was only low to moderate. Tai Chi is a low-intensity activity, which yields significant health improvement similar to WLK. This result provides insight showing that even a low intensity of activity (~3 METs, 56% HR max) produces significant health improvement.

The present study reports similar health and fitness improvement for TCC and WLK. However, when the magnitudes of the measured variables are observed, some parameters after WLK did elicit slightly higher improvements than TCC, although not statistically significant. The present study failed to reveal improvements in blood lipid profiles. The latter findings should be viewed as pertaining to relatively short periods of exercise intervention; limited studies have found changes in blood lipid profiles associated with TCC. Further studies with longer intervention periods are suggested.

Acknowledgement

This study was supported by the Health and Health Services Research Fund (HHSRF: 02030511), Food and Health Bureau, Hong Kong SAR Government.

References

1. Hong Kong Sports Development Board. Sports Participation Survey 2000. Hong Kong: Hong Kong Sports Development Board; 2002.
2. Murphy M, Nevill A, Neville C, Biddle S, Hardman A. Accumulating brisk walking for fitness, cardiovascular risk, and psychological health. Med Sci Sports Exerc 2002;34:1468-74.
3. Channer KS, Barrow D, Barrow R, Osborne M, Ives G. Changes in haemodynamic parameters following Tai Chi Chuan and aerobic exercise in patients recovering from acute myocardial infarction. Postgrad Med J 1996;72:349-51.
4. Lan C, Lai JS, Chen SY, Wong MK. 12-month Tai Chi training in the elderly: its effect on health fitness. Med Sci Sports Exerc 1998;30:345-51.
5. Li JX, Hong Y, Chan KM. Tai chi: physiological characteristics and beneficial effects on health. Br J Sports Med 2001;35:148-56.
6. Gong LS, Qian JA, Zhang JS, et al. Changes in heart rate and electrocardiogram during Taijiquan exercise: analysis by telemetry in 100 subjects. Chin Med J (Engl) 1981;94:589-92.

DR Thompson
NB Oldridge
DSF Yu 余秀鳳
CM Yu 余卓文

Translation and validation of two Chinese health-related quality of life instruments in patients with coronary heart disease

Key Messages

1. The Chinese version of the 27-item MacNew health-related quality of life (HRQL) questionnaire is a valid, reliable and responsive core coronary heart disease (CHD)–specific HRQL measure. It can be used to compare the health outcomes, burdens of illness, and treatment effectiveness in pure or mixed populations of patients with myocardial infarction, angina, or heart failure in clinical trials and in routine clinical practice.
2. The Chinese version of the 35-item Myocardial Infarction Dimensional Assessment Scale (MIDAS) did not perform as well. Although four of the seven subscales, which cover the physical and psychosocial aspects of HRQL, are psychometrically sound when used to evaluate HRQL among CHD patients with different cardiac diagnostic categories, the remaining three subscales covering treatment-related aspects are not. The latter had only weak validity and responsiveness, which may be due to cultural differences.
3. To improve the overall performance of the Chinese version of the MIDAS, further effort is required to clarify the treatment-related impact of CHD on well being from the patient's perspective.

Hong Kong Med J 2009;15(Suppl 2):S8-11

The Nethersole School of Nursing, The Chinese University of Hong Kong
DR Thompson, DSF Yu
College of Health Sciences, University of Wisconsin-Milwaukee and Heart Care Associates, Milwaukee, WI, US
NB Oldridge
Department of Medicine and Therapeutics, The Chinese University of Hong Kong
CM Yu

HHSRF project number: 02030671

Principal applicant and corresponding author:
Prof David R Thompson
Rm 725d, The Nethersole School of Nursing, The Chinese University of Hong Kong, Shatin, NT, Hong Kong SAR, China
Tel: (852) 2609 6221
Fax: (852) 2609 7009
E-mail: davidthompson@cuhk.edu.hk

Introduction

The prevalence of coronary heart disease (CHD) is increasing in Asia, including Hong Kong and mainland China, where it is a major cause of death and disability.[1] Patients with CHD are typically diagnosed by physician with one or more of three inter-related (but clinically distinct) conditions: myocardial infarction (MI), angina pectoris, or heart failure. This diagnostic conceptualisation has led to important increases in specific treatments with researchers increasingly focusing their attention on comparing the efficacy of one intervention with another among homogeneous groups of patients meeting explicit diagnostic criteria. Comparing the burden of illness and treatment effectiveness for CHD across the spectrum of patients with frequently co-occurring conditions, such as MI, angina pectoris or heart failure, requires a common outcome measure. Yet, a major limitation of existing condition-specific health-related quality of life (HRQL) instruments is that they are not suitable for making comparisons across different CHD diagnoses.

The purpose of this study was to translate the MacNew health-related quality of life questionnaire[2] (MacNew) and the Myocardial Infarction Dimensional Assessment Scale[3] (MIDAS) into Chinese, and to examine their psychometric properties in Chinese patients with differential diagnoses of CHD, including MI, angina pectoris or heart failure.

Methods

Study design

This was a longitudinal study.

Subjects and settings

A convenience sample of 398 patients with evidence of CHD was recruited from the cardiac unit of a regional hospital between December 2004 and February 2006. Of these, 365 (MI: 117; angina: 154; heart failure: 94) completed all the study instruments; 92 of the latter were randomly selected for 7-day post-test assessment with the tested instruments, and the 3-month repeat data collection was completed in 363. The mean age of the patients was 65 (standard deviation, 12) years, with more heart failure patients being older (P=0.009). The male-to-female ratio was lower among patients with heart failure (2:1) than MI or angina (4:1).

Main study instruments

The 27-item C-MacNew and the 35-item C-MIDAS were translated from their original English versions by using Brislin's model of forward and backward translation. Based on a 7-point and 5-point Likert scale, the C-MacNew and the C-MacNew examine CHD disease–specific quality of life in three (physical, emotional, and social) and seven (physical activity, insecurity, emotional reaction, dependency, diet, concerns over medication, side-effects) dimensions, respectively. Previous studies have demonstrated high validity and reliability for both of these instruments.

Table 1. Reliability of Chinese versions of MacNew health-related quality of life questionnaire (C-MacNew) and the Myocardial Infarction Dimensional Assessment Scale (C-MIDAS)

Instruments	Myocardial infarction	Angina	Heart failure
C-MacNew			
Overall scale	0.91	0.94	0.94
Physical	0.86	0.89	0.88
Emotion	0.90	0.92	0.92
Social	0.88	0.91	0.90
C-MIDAS			
Overall scale	0.94	0.95	0.93
Physical activity	0.90	0.92	0.87
Insecurity	0.95	0.94	0.92
Emotional reaction	0.86	0.90	0.88
Dependency	0.78	0.79	0.65
Diet	0.88	0.85	0.90
Concerns over medication	0.79	0.82	0.70
Side-effects	0.70	0.77	0.67

Translation and validation plan

1. The reliability of the C-MacNew and the C-MIDAS was determined by examining their internal consistency and 7-day test-retest reliability with Cronbach's alpha and intraclass correlation coefficient, respectively.
2. Construct validity of the C-MacNew and the C-MIDAS was established by computing their correlations with the Short-Form 36-item Health Survey (SF-36) and the Hospital Anxiety and Depression Scale (HADS). Confirmatory factor analysis was also used to determine whether the C-MacNew and the C-MIDAS conform to the factor structure of their respective original versions.
3. Discriminatory validity was determined by using the logic of 'known-groups' approach, using age, gender, the presence or absence of anxiety and depression according to the HADS score, and perceived health deterioration (according to the health transition item of the SF-36) as discriminative variables.
4. Longitudinal validity was determined by examining the correlations of the changes in the C-MacNew and the C-MIDAS scores with the changes in the SF-36 scores over a 3-month period.
5. Responsiveness of the C-MacNew and the C-MIDAS was determined by computing the effect size and standardised response mean for the changes of scores over a 3-month period.

RESULTS

Reliability

The results suggest good internal consistency for the C-MacNew and the C-MIDAS in measuring HRQL for patients with different cardiac diagnostic categories, though the Cronbach's alphas for the 'side-effects' and 'dependency' subscales of the C-MIDAS were slightly lower than the criterion level in heart failure patients (Table 1). Both the instruments are reproducible, with intraclass correlation coefficient ranged from 0.88-0.93 and 0.72-0.92, respectively.

Validity

The construct validity of the C-MacNew and the C-MIDAS (except the 'diet', 'concerns over medication' and 'side-effects') was supported by their significant moderate-to-strong correlations with both SF-36 physical and mental component scores and the HADS anxiety and depression scores (Table 2). Results of confirmatory factor analysis also indicated that the C-MacNew (χ^2/df=1.41, RMSEA=0.043, NFI=0.93, NNFI=0.94 and CFI=0.95) and C-MIDAS (χ^2/df=2.32, RMSEA=0.059, NFI=0.94, NNFI=0.95, CFI=0.96) conformed to the original 3-factor and 7-factor structure, respectively. However, the measurement model of the C-MacNew suggested that there was only one item (instead of 12 items in the original version) that loaded significantly onto more than one subscale, whereas that of the C-MIDAS suggested the existence of error covariance between item 2 (had angina symptom) and item 3 (had angina that affected life).

The results of discriminative validity indicated that both the C-MacNew and the C-MIDAS (except for 'diet', 'concerns over medication', 'side-effects' subscales) identified poorer HRQL in MI or angina patients who reported anxiety and perceived deteriorated health. Both instruments also identified a significantly poorer HRQL in female patients with angina. As for heart failure patients, the C-MacNew and two subscales of the C-MIDAS scores (ie 'physical activity' and 'insecurity') indicated significantly poorer HRQL in patients who were female, at old age, with anxiety and with perceived health deterioration.

Longitudinal validity of the C-MacNew and the C-MIDAS was also established as the changes in the majority of the subscales' scores showed a significant and moderate relationship with the changes in the SF-36 physical and mental component scores over a 3-month period. Nevertheless, three C-MIDAS subscales which had low discriminative validity (ie 'diet', 'concerns over medication', 'side-effects') also had poor performance on longitudinal validity testing (Table 3).

Responsiveness

The mean changes in the C-MacNew and C-MIDAS scores were statistically significant ($P<0.001$) in the three cardiac diagnostic groups. The results indicated a moderate-to-strong responsiveness of C-MacNew in detecting changes in HRQL (effect size: 0.51-0.78; standardised response mean: 0.53-0.78) in all the three cardiac diagnostic groups. This was also true for most of the C-MIDAS subscales (effect size: 0.43-0.94; standardised response mean: 0.46-0.96), with the exception of 'concerns over medication' and 'side-effects' subscales (effect size, 0.20-0.38; standardised response mean, 0.21-0.37).

Discussion

This study substantiates previously published psychometric data on the original versions of MacNew and MIDAS

Table 2. Construct validity of Chinese versions of MacNew health-related quality of life questionnaire (C-MacNew) and the Myocardial Infarction Dimensional Assessment Scale (C-MIDAS)

Instruments	Myocardial infarction	Angina	Heart failure
Correlation with Short-Form 36-item Health Survey (SF-36) physical component scores			
C-MacNew: physical	0.60‡	0.62‡	0.64‡
C-MacNew: emotional	0.48‡	0.47‡	0.50‡
C-MacNew: social	0.55‡	0.55‡	0.57‡
C-MIDAS: physical activity	-0.61†	-0.69†	-0.71†
C-MIDAS: insecurity	-0.43†	-0.56†	-0.54†
C-MIDAS: emotional reaction	-0.28†	-0.39†	-0.41†
C-MIDAS: dependency	-0.43†	-0.47†	-0.50†
C-MIDAS: diet	-0.17§	-0.12§	-0.04§
C-MIDAS: concerns over medication	-0.22*	-0.16§	-0.07§
C-MIDAS: side-effects	-0.29†	-0.29†	-0.07§
Correlation with SF-36 mental component scores			
C-MacNew: physical	0.58‡	0.56‡	0.66‡
C-MacNew: emotional	0.59‡	0.59‡	0.70‡
C-MacNew: social	0.56‡	0.57‡	0.66‡
C-MIDAS: physical activity	-0.54†	-0.63†	-0.58†
C-MIDAS: insecurity	-0.44†	-0.62†	-0.58†
C-MIDAS: emotional reaction	-0.46†	-0.53†	-0.58†
C-MIDAS: dependency	-0.48†	-0.46†	-0.46†
C-MIDAS: diet	-0.22*	-0.07§	-0.12§
C-MIDAS: concerns over medication	-0.30†	-0.13§	-0.27†
C-MIDAS: side-effects	-0.29†	-0.16*	-0.26†
Correlation with Hospital Anxiety and Depression Scale (HADS) anxiety score			
C-MacNew: physical	-0.44‡	-0.47‡	-0.37‡
C-MacNew: emotional	-0.67‡	-0.68‡	-0.59‡
C-MacNew: social	-0.47‡	-0.50‡	-0.44‡
C-MIDAS: physical activity	0.39‡	0.38‡	0.32†
C-MIDAS: insecurity	0.59‡	0.56‡	0.51‡
C-MIDAS: emotional reaction	0.58‡	0.49‡	0.46‡
C-MIDAS: dependency	0.49‡	0.46‡	0.45‡
C-MIDAS: diet	-0.06§	-0.01§	-0.20§
C-MIDAS: concerns over medication	0.28†	0.21†	0.16§
C-MIDAS: side-effects	0.17§	0.25†	0.23*
Correlation with HADS depression score			
C-MacNew: physical	-0.53‡	-0.55‡	-0.61‡
C-MacNew: emotional	-0.80‡	-0.75‡	0.70‡
C-MacNew: social	-0.56‡	-0.59‡	-0.67‡
C-MIDAS: physical activity	0.47‡	0.47‡	0.57‡
C-MIDAS: insecurity	0.62‡	0.54‡	0.53‡
C-MIDAS: emotional reaction	0.53‡	0.34‡	0.36‡
C-MIDAS: dependency	0.48‡	0.37‡	0.49‡
C-MIDAS: diet	0.02§	-0.02§	0.02§
C-MIDAS: concerns over medication	0.36‡	0.18*	0.05§
C-MIDAS: side-effects	0.23*	0.25†	-0.01§

* P<0.05
† P<0.01
‡ P<0.001
§ Not significant

Table 3. Longitudinal validity of Chinese versions of MacNew health-related quality of life questionnaire (C-MacNew) and the Myocardial Infarction Dimensional Assessment Scale (C-MIDAS)

Instruments	Changes in Short-Form 36-item Health Survey					
	Physical component score			Mental component score		
	Myocardial infarction	Angina	Heart failure	Myocardial infarction	Angina	Heart failure
Changes in C-MacNew						
Physical	0.63‡	0.66‡	0.65‡	0.53‡	0.59‡	0.58‡
Emotion	0.58‡	0.48‡	0.51‡	0.58‡	0.58‡	0.61†
Social	0.58‡	0.62‡	0.54‡	0.55‡	0.56‡	0.62‡
Changes in C-MIDAS						
Physical activity	-0.61‡	-0.57‡	-0.57‡	-0.47‡	0.60‡	0.50‡
Insecurity	-0.31‡	-0.45‡	-0.45‡	-0.30†	0.58‡	0.47‡
Emotional reaction	-0.26†	-0.33‡	-0.40‡	-0.34‡	0.48‡	0.41‡
Dependency	-0.24*	-0.41‡	-0.52‡	-0.39‡	0.30‡	0.35†
Diet	-0.93§	0.05§	-0.01§	-0.12§	0.13§	0.25*
Concerns over medication	-0.22*	-0.02§	-0.24*	-0.22*	0.10§	0.31†
Side-effects	-0.16§	-0.06§	-0.12§	-0.26†	0.12§	0.20§

* P<0.05
† P<0.01
‡ P<0.001
§ Not significant

in CHD patients. Both of these instruments are internally consistent and reproducible in Chinese patients in each of the three CHD diagnostic groups (MI, angina, and heart failure). Their factor structures are similar to those of their respective original versions for measuring the various aspects of HRQL among CHD patients. C-MacNew and four of the seven subscales of C-MIDAS (physical activity, insecurity, emotional reactions, dependency) demonstrated good construct and longitudinal validity. They are also responsive to detecting changes in HRQL in the three cardiac diagnostic groups. All these findings provide strong evidence to suggest that the C-MacNew may have value as a core questionnaire in patients with a differential diagnosis of CHD.

As for C-MIDAS, the poor performance of the three subscales (diet, concerns over medication and side-effects) may be related to concerns about risk factors for CHD and worries about medical treatment that patients regard as less important in interpreting disease impact and life situations.[4] Some studies also found that CHD patients did not consider adjusting their lifestyle in order to reduce CHD risk factors as important. Such an attitude might be more prominent in the current sample, as older people in Chinese culture tend to adopt a 'do nothing approach' and allow fate to take its course.[5] As for the 'side-effects' subscale, the items such as 'felt the cold more' and 'unwanted side-effect' might not be specific enough to assess patients' problems associated with medical treatment. Although the study provides evidence of adequate psychometric properties of only four of the Chinese MIDAS subscales, these four subscales provide a wide coverage of the physical and psychosocial health and functioning of CHD patients. As the original MIDAS suggests the use of subscale scores, these subscales can be used as an independent, reliable, valid and responsive core CHD-specific HRQL measure among patients in different diagnostic categories. Improving the performance of the Chinese MIDAS requires further effort to clarify patients' perspectives of treatment-related impact of CHD on well being.

This study has limitations. First, recruiting a consecutive sample of CHD patients managed in a single acute care setting may limit the generalisability of the findings for patients in community-dwelling or rehabilitative settings. Second, the over-representation of male patients in the sample further threatens the external validity of the findings. Finally, as we only collected 7-day post-test data from 25% of the patients, the reproducibility of the C-MacNew and the C-MIDAS could not be examined for each cardiac diagnostic group individually.

Conclusions

In conclusion, there is sufficient evidence that the psychometric properties of the C-MacNew and some of the subscales of the C-MIDAS are adequate to warrant recommending these HRQL instruments for Chinese patients with MI, angina or heart failure as an outcome measure to enhance treatment evaluation for patients with CHD. They can be used to compare health outcomes, burden of illness, and treatment effectiveness on pure or mixed populations with the three previously mentioned cardiac diagnoses.

Acknowledgement

This study was supported by the Health and Health Services Research Fund (HHSRF: 02030671), Food and Health Bureau, Hong Kong SAR Government.

References

1. Death rates for leading causes, 2001-2007. Centre for Health Protection, Department of Health, The Government of the Hong Kong Special Administrative Region. http://www.chp.gov.hk/data.asp?lang=en&cat=4&dns_sumID=117&id=27&pid=10&ppid. Accessed 14 October 2008.
2. Lim LL, Valenti LA, Knapp JC, et al. A self-administered quality-of-life questionnaire after acute myocardial infarction. J Clin Epidemiol 1993;46:1249-56.
3. Thompson DR, Jenkinson C, Roebuck A, Lewin RJ, Boyle RM, Chandola T. Development and validation of a short measure of health status for individuals with acute myocardial infarction: the myocardial infarction dimensional assessment scale (MIDAS). Qual Life Res 2002;11:535-43.
4. Emslie C. Women, men and coronary heart disease: a review of the qualitative literature. J Adv Nurs 2005;51:382-95.
5. Webster R. The experiences and health care needs of Asian coronary patients and their partners. Methodological issues and preliminary findings. Nurs Crit Care 1997;2:215–23.

J Woo 胡令芳
E Hui 許鵬思
D Hui 許樹昌
CM Lum 林楚明
KH Or 柯加恒
T Kwok 郭志銳

A pilot study to examine the feasibility and acceptability of a community model for exercise prescription for patients with chronic disease

Key Messages

1. A model of community care for chronic obstructive pulmonary disease (COPD) and chronic heart failure (CHF) that incorporates exercise prescription is lacking, although the benefits of exercise for these diseases are established.
2. Group programmes incorporating exercise, disease education, and social support consisting of weekly sessions for 12 weeks were designed for COPD and CHF patients, in groups of 8 to 10. A home exercise programme was also prescribed.
3. This model was feasible, enjoyed good compliance, improved symptoms and measures of psychosocial outcome for both disease and improved exercise tolerance in the CHF group.
4. This model could be further developed as an integral part of community management for patients with chronic diseases.

Hong Kong Med J 2009;15(Suppl 2):S12-6

Department of Community and Family Medicine, The Chinese University of Hong Kong
J Woo, E Hui, D Hui, CM Lum, KH Or, T Kwok

HHSRF project number: 02030711

Principal applicant and corresponding author:
Prof J Woo
Department of Community and Family Medicine, The Chinese University of Hong Kong, Shatin, NT, Hong Kong SAR, China
Tel: (852) 2632 3141
Fax: (852) 2637 3852
E-mail: jeanwoowong@cuhk.edu.hk

Introduction

Chronic diseases such as osteoarthritis, heart disease, chronic obstructive airways disease, and diabetes mellitus, account for a large proportion of the Hong Kong Hospital Authority's health care expenditure. For example, during 1997, chronic obstructive airways disease accounted for the largest number of bed days occupied (BDO) in its acute hospitals, and the second largest number of BDO in all types of its hospitals. Ischaemic heart disease, heart failure, and diabetes ranked 5th, 6th, and 7th highest in terms of BDO for acute hospitals. Although accounting for half the BDO compared with diabetes mellitus, osteoarthritis is a common condition affecting the elderly population that gives rise to disability. With the ageing of the population, problems with mobility are also prevalent. Currently there is an emphasis on pharmacological treatment for chronic diseases for which there is no cure, when the approach should be to maximise the remaining quality of life. This might be achieved through promoting the capacity for independent living and social functioning, as well as psychosocial well being. Although the benefits of exercise in chronic disease prevention are well known, the benefits of physical activity among those with established diseases are not widely appreciated. Thus, in general an exercise prescription is seldom incorporated as part of chronic disease management. Currently, exercise forms part of short-term, hospital rehabilitation-based programmes for stroke, myocardial infarction, chronic obstructive lung disease, and osteoarthritis. In reality, exercise prescription should be applied to a wider spectrum of patients on a continuing basis as part of their therapy. Patients with the above chronic heart failure, diabetes mellitus, as well as the frail elderly with mobility problems merit exercise prescriptions.[1] Thus, improvements in exercise tolerance as well as psychological and social well being have been achieved in patients with chronic obstructive airways disease as well as heart failure.[1] This is in addition to the use of exercise in health promotion for disease prevention. However, it is uncertain how this should be incorporated into the disease management programme. Questions such as the site (home versus health care facility), the contents of the programme, whether it should be a group or individual programme, have largely been unexplored. A key target for any model of exercise prescription should be to motivate patients to persevere with such programmes. Therefore, any model should include characteristics that are likely to encourage compliance. The assumption of primary care patient services by the Hospital Authority in 2003 provides an opportunity to develop and test such a model for incorporating exercise prescriptions into the management of chronic diseases and frailty. Although this model of service provision has theoretical benefits, it is not known how the public or health care professionals may perceive its usefulness. Moreover, there is little information regarding the feasibility and possible benefits of such a model. Before this model is incorporated into existing services, a pilot study is needed to test its feasibility, with a view to a subsequent larger study to evaluate its effectiveness.

Aims

- To develop a model for community management of chronic disease and frailty, that incorporates exercise prescription, using chronic obstructive pulmonary disease (COPD) and chronic heart failure (CHF) as examples;

- To test its feasibility in community centres linked to COPDs;
- To determine patient response using quantitative and qualitative methods; and
- To document means of measuring physical performance as well as psychosocial well being before and after the programme.

Subjects and methods

This study was conducted from September 2004 to February 2005. Ambulant patients with COPD and CHF living in the community and able to go outdoors were targeted. From among these, patients admitted to hospital at least once in the past 12 months were recruited from (i) the medical wards of the Prince of Wales Hospital, Shatin Hospital, (ii) out-patient clinics, and (iii) enhanced home care facilities.

Subjects who were dyspnoeic at rest or on the slightest exertion (eg getting out of bed), who could not walk or follow instructions (eg due to dementia); who had uncontrolled angina; resting systolic blood pressure of >180 mm Hg or resting diastolic blood pressure of >100 mm Hg, resting tachycardia >100 bpm, unstable or acute heart failure were excluded. Patients with acute systemic illness (eg pneumonia), uncontrolled visual or vestibular disturbances, and any recent injurious fall were also excluded.

Exercise programmes

Although patients may be taught exercise routines to be carried out at home, we hypothesised that compliance may be better if conducted with a group in a community centre, since group settings could promote social interaction, simultaneously act as a chronic disease mutual support system, and allow regular contact with health carers. The programme was designed by a team of doctors, nurses and physiotherapists. In general aerobic exercise routines were suitable for improving cardiorespiratory function,[2] while resistance exercises were suitable for improving muscle strength and balance,[3] and exercise in general had metabolic benefits. In order to improve compliance, the exercise programme was devised to be enjoyable. For example, in a previous study it has been shown that walking exercise had a higher dropout rate than Tai Chi. Each disease group consisted of five to 10 patients, and was led by a trained research assistant, and two sessions per week (for each disease) were held, for a total of 12 weeks. At least three groups were held for each disease. Patients were also encouraged to carry out exercises on their own for the rest of the week.

Chronic obstructive pulmonary disease programme

Baseline measurements

These consisted of St Georges Respiratory Questionnaire,[4] the General Health Questionnaire (to assess subject knowledge regarding the disease), lung function measurements (FEV1, FVC), and the 6-minute walk test.

Intervention

This consisted of an educational talk, a group discussion, group exercises (warm up, breathing, free arm raising and sit-stand exercises with and without resistance, aerobic activities such as dancing), and weekly review of exercises carried out at home.

End of intervention assessment

Primary outcome measures

These were related to compliance (attendance rate at group sessions, number of days of exercise at home [recorded in a diary]) and patients' view of the service.

The patients' view of the usefulness of the service in relation to their functional ability, symptoms, general well being, intention to continue the programme, and value of mutual support were sought, using a structured questionnaire as well as by running focus groups. The focus group evolved as part of the last session. The following areas were explored with the group: the reason for agreeing to join the programme, comments on the running of the programmes (positive and negative aspects), and their perspective of the benefits of the programme itself. In addition, other spontaneous comments were also entertained from the participants. The discussions were recorded and then transcribed. Common themes were identified, and the responses grouped according to the categories. Additional comments that did not fall into these common themes were also listed.

Secondary outcome measures

These included repeat of baseline measurements to assess any symptom improvement, imporvement in general health, disease knowledge and exercise tolerance.

Chronic heart failure programme

Baseline measurements

These consisted of the CHF questionnaire, the test of knowledge regarding heart failure, the Social Support Survey Questionnaire,[5] and the Hospital Anxiety Depression Scale. These scales have already been used in an ongoing community study to evaluate the effect of relaxation therapy in CHF patients admitted to hospital. Comparison of results from the proposed study with the ongoing study can give some indication of the representativeness of the subjects, an important consideration pertinent to the small sample size of this pilot study. Body weight and blood pressure were recorded; body weight being an indicator of fluid balance, an important parameter related to the control of heart failure. The 6-minute walk test was used as an indicator of exercise tolerance, and biceps and quadriceps strength were measured using a dynamometer.

Intervention

This was similar to the programme for COPD, but with

Table 1. Comparison of psychological status at baseline and at the 12-week follow-up

Questionnaire*	Baseline† (n=33)	12-week follow-up† (n=33)	P value
GHQ- somatic symptoms domain	4.15 (2.54)	2.36 (1.82)	<0.001
GHQ- anxiety and insomnia domain	4.00 (2.96)	1.82 (1.93)	<0.001
GHQ- social dysfunction domain	8.85 (3.36)	6.48 (1.94)	<0.001
GHQ- depression domain	3.61 (3.57)	1.55 (2.22)	<0.001
GHQ- total score (/28)	20.61 (10.09)	12.21 (5.97)	<0.001
SGRQ- symptom domain (/99.99)	60.52 (24.10)	38.91 (19.27)	<0.001
SGRQ- activity domain (/99.99)	62.76 (29.52)	52.13 (25.90)	0.044
SGRQ- impact domain (/99.99)	46.36 (23.36)	26.34 (13.21)	<0.001
SGRQ- total score (/99.99)	53.69 (19.61)	34.72 (14.12)	<0.001

* GHQ denotes General Health Questionnaire, SGRQ St George's Respiratory Questionnaire

† Data presented as mean (standard deviation). Lower score represent better quality of life

Table 2. Comparison of the exercise endurance, and chronic obstructive pulmonary disease (COPD) knowledge at baseline and at the 12-week follow-up

	Baseline* (n=33)	12-week follow-up* (n=33)	P value
6-minute walking distance (m)	285 (96)	303 (98)	0.051
COPD knowledge test (/10)	6.6 (2.0)	8.8 (1.1)	<0.001

* Data presented as mean (standard deviation)

deletion of breathing exercises, which are specific to COPD.

End of intervention assessment

Primary outcome measures were the same as for COPD. Secondary outcome measures were repeat of baseline measurements to assess any change in disease knowledge, improvement in symptoms, psychological function, and muscle strength.

Results

Chronic obstructive pulmonary disease

Based on the recruitment criteria, 44 subjects with COPD participated in the Community Pulmonary Rehabilitation Programme (CPRP). Their mean age was 74 (standard deviation [SD], 7) years. After 12 weeks of CPRP, 33 subjects finished and 11 dropped out, mainly due to frequent readmissions to hospital, moving to Old Aged Homes or out of the Shatin district, transport problems, and comorbidity. Only two subjects refused exercise. Among those who completed the programme, the average attendance rate at the sessions was 78% (40%-100%). Compliance with home exercises, calculated as the number of sessions recorded in the diary divided by the prescribed number, was 77%.

Outcome evaluation

There was a statistically significant improvement in symptoms and all psychological domains (Table 1), as well as disease knowledge (Table 2). Mean exercise tolerance improved by 18 metres (6%) in the 6-minute walking test, although this was not statistically significant.

Programme evaluation

The vast majority (97%) of the subjects could follow the exercise and noted a general improvement in physical status. Most (86%) did not have problems travelling from home to the community centre. Three quarters (76%) of the participants felt that the group setting was supportive; it enabled continuous coping with their disease and were willing to re-attend any similar course next time. Over half (52%) preferred group exercise to home exercise.

In the focus group interviews regarding the disease, a major preoccupation was with finding ways to minimise the shortness of breath interfering with normal daily activities and consequential social isolation. Other comments regarding the disease included: lack of control, a desire to live longer in the event that newer, more effective treatments became available, and the expectation that the programme could improve symptoms.

Regarding the intervention programme, seven major themes emerged, relating to: acquiring knowledge, increasing exercise tolerance, encouragement to stop smoking, fewer visits to doctors or hospitals, making life happier and more meaningful, gaining a sense of accomplishment and improvement in self confidence, and psychological support.

Other general comments showed that the subjects perceived the programme as filling a service gap. However, participants wanted the group leader to demonstrate exercises by doing the moves simultaneously with the subjects at the same pace, to facilitate following all the steps. The group leaders have noted that in the group setting, participants commented on each other's health behaviours (eg smoking), and discussed the impact of their disease on family relationships.

Chronic heart failure

Thirty-seven subjects participated in the programme. The

Table 3. Evaluation of programme questionnaire

No.	Question	Disagree (%)	Ambiguous (%)	Agree (%)
1	I will attend the similar course next time	3	16	81
2	I can finish all exercises	0	9	91
3	I prefer group exercise than home exercise	28	19	53
4	I feel that my physical health is better than before	0	6	94
5	The group mates help me handle my disease	3	9	88
6	I did not have any travelling problem	0	3	97

Table 4. Baseline and 12-week follow-up data in psychosocial measures

	Baseline score* (n=37)	12-week score* (n=32)	Differences within groups* (pair=32)	P value
The Hospital Anxiety and Depression Scale†				
Anxiety	5.86 (3.84)	3.47 (3.03)	-2.41 (3.26)	<0.001
Depression	8.59 (4.67)	5.44 (3.28)	-2.97 (3.61)	<0.001
Medical Outcome Study Social Support Survey				
Tangible	67.40 (24.70)	85.94 (14.02)	16.99 (18.26)	<0.001
Affectionate	56.08 (26.55)	73.18 (26.84)	16.41 (19.68)	<0.001
Positive social interaction	46.79 (26.54)	60.94 (27.03)	13.48 (22.46)	0.002
Emotional/informational	46.96 (21.47)	59.47 (22.13)	13.28 (19.67)	0.001
The Chronic Heart Failure Questionnaire				
Dyspnoea	4.05 (0.95)	5.31 (0.92)	1.26 (0.82)	<0.001
Fatigue	4.21 (1.17)	5.01 (0.94)	0.80 (0.92)	<0.001
Emotional function	4.60 (1.39)	5.37 (0.99)	0.77 (0.85)	<0.001
Mastery	4.69 (1.20)	5.31 (0.92)	1.20 (1.03)	<0.001

* Data are presented as mean (standard deviation)
† Lower scores represent better condition

Table 5. Baseline and 12-week follow-up data in the 6-minute walking test, muscle strength test, and chronic heart failure (CHF) knowledge questionnaire

	Baseline score* (n=37)	12-week score* (n=32)	Differences within groups* (pair=32)	P value
Muscle strength test (kg)				
Quadriceps right	12.78 (4.97)	19.12 (5.28)	6.34 (5.57)	<0.001
Quadriceps left	12.88 (5.38)	18.31 (4.35)	5.43 (5.22)	<0.001
Biceps right	15.98 (6.63)	18.88 (6.20)	2.89 (4.45)	0.001
Biceps left	14.88 (5.64)	18.09 (5.45)	3.20 (3.82)	<0.001
6-minute walking test (m)	329.51 (103.18)	380.87 (90.32)	30.13 (38.93)	<0.001
CHF knowledge test (/10)	7.76 (1.69)	9.63 (0.55)	1.56 (1.39)	<0.001

* Data are presented as mean (standard deviation)

mean age of the subjects was 74 (SD, 8) years. The mean participation rate for the 12 sessions was 91% (SD, 11%). A total of 87% of the subjects completed the 12-week course. The majority gave a positive questionnaire assessment of the programme (Table 3). While there was general agreement with the beneficial nature of the programme, only about half preferred participating in a group. There was significant improvement in all psychosocial measures (Table 4), muscle strength, exercise tolerance, and disease knowledge (Table 5).

In the group interviews, discussions targeted three main themes: the reasons subjects wanted to join the programme, experience with the group programme, and the perceived benefits and effectiveness of the programme. Regarding the reasons for joining the programme, four common themes were identified: improving physical health, improving symptoms, desire for more knowledge, and a hope to reduce hospital admissions.

Seven common themes were identified in discussing the experience with the group programme: more motivation to exercise in a group; benefits of mutual support in promoting learning; enjoyment; reduced psychological burden; benefit of group sessions in behaviour modification; improved awareness of disease prevention; and increased social contact.

Regarding the benefits and effectiveness of the programme, seven themes were identified: ability to develop a regular exercise habit; improvement in symptoms; ability to modify diet; increased knowledge in disease management; psychological support; increased social contact; and prevention of hospital admissions.

Discussion

This study showed that a group programme for COPD and CHF patients is feasible in the setting of a community

centre, and was able to achieve improvement in symptoms and quality of life, with good compliance. It catered to current unmet needs, in the area of patient education, and rehabilitation group support, in an easily accessible setting. The emphasis on patient empowerment follows the Wagner model of management of chronic illness, in mobilising community resources, to enable patients to be the principal caregivers. Such models have also been widely promoted in the UK, and the US.

The main advantage of a group setting is that one group leader can cater for more than one patient at a time, whilst achieving similar results to more labour-intensive one-to-one settings. Other advantages include: feedback from patients, the exercise programme can become part of a daily social routine, knowledge can be reinforced in a group setting, and facilitation of behaviour modification such as smoking cessation. The group environment could also reduce social isolation, and anxiety/depression, possibly by improving self-efficacy or self-esteem, or through mutual support. A palliative care component may be built on this framework in future. Such a service in the setting of a community centre attached to a primary care clinic would be easily accessible, and referrals to doctors could be easily arranged. With the development of the nurse practitioner or nurse consultant, the programme can be nurse-led, or led by trained volunteers (under the supervision of a nurse, or patient leader).

Currently, in Hong Kong patients with COPD and CHF form the largest group of patients readmitted within 28 days of discharge, but it is unclear what percentage of these is avoidable. This study shows that a considerable improvement could be made in the care of these patients in the community. Addressing these unmet needs, particularly in the psychosocial category, may help reduce use of hospital services. However, improvement in quality of care of chronic diseases may not always translate into cost savings, as demonstrated for diabetes mellitus. In the case of COPD and CHF, since the intervention largely dealt with exercises, education and mutual support rather than investigations and multiple drug therapies, such a community model may result in cost savings as well as improved quality of care.

There were limitations to the study. This was essentially a pilot study where a group community intervention programme was designed and tested for feasibility and acceptability. It was not a randomised controlled trial comparing intervention versus usual management. Since there were many components in the programme, it is uncertain whether one or more of them was responsible for the good outcomes. Moreover, some of the benefits highlighted in the focus group were difficult to quantify. The number of subjects was small, and there was no information on what percentage of eligible patients would agree to join. Arguably those who participated were a select group who were already motivated. No costings were carried out, and the impact on hospital readmissions was not measured, due to the small number of subjects and the short duration of the observations. It is uncertain whether a programme of 3 months duration would have a long-lasting impact. From the exercise and psychological viewpoint, the intervention should ideally form part of the regular activity of community centres, in place of the predominantly social nature of activities. In spite of these limitations, this pilot study shows that a group community intervention programme for COPD and CHF patients is feasible and acceptable, achieves improvement in disease knowledge, symptoms and quality of life. Such a model could be developed further as an initiative in the management of chronic diseases in the community.

Acknowledgement

This study was supported by the Health and Health Services Research Fund (HHSRF: 02030711), Food and Health Bureau, Hong Kong SAR Government.

References

1. Young A, Harries M Edr. Physical activity for patients: an exercise prescription. Royal College of Physicians 2001.
2. Kavanagh T, Myers MG, Baigrie RS, Mertens DJ, Sawyer P, Shephard RJ. Quality of life and cardiorespiratory function in chronic heart failure: effects of 12 months' aerobic training. Heart 1996;76:42-9.
3. Feigenbaum MS, Pollock ML. Prescription of resistance training for health and disease. Med Sci Sports Exerc 1999;31:38-45.
4. Jones PW, Quirk FH, Baveystock CM, Littlejohns P. A self-complete measure of health status for chronic airflow limitations. The St. George's Respiratory Questionnaire. Am Rev Respir Dis 1992;145:1321-7.
5. Yu DSF, Lee DTF, Woo J. Establishing the validity and reliability of the Chinese versions of the Chronic Heart Failure Questionnaire and the Medical Outcome Study Social Support Survey. HSRC Report September 2002 and Annual Symposium of the 10th HK Association of Gerontology Nov 30, 2002. Available at: http://fhbgrants.netsoft.net/report/S112002fr.pdf.

KPY Liu 廖佩儀

Use of mental imagery to improve task generalisation after a stroke

Key Messages

Patients who received mental imagery intervention showed better performance on 15 daily tasks than the control group in both the training environment (P=0.02) and a novel simulated environment (P<0.05).

Hong Kong Med J 2009;15(Suppl 4):S37-41

Department of Rehabilitation Sciences, The Hong Kong Polytechnic University
KPY Liu

HSRF project number: 03040051

Principal applicant and corresponding author:
Dr Karen PY Liu
Department of Rehabilitation Sciences, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong SAR, China
Tel: (852) 2766 4801
Fax: (852) 2330 8656
E-mail: karen.liu@inet.polyu.edu.hk

Introduction

Stroke rehabilitation aims to help people regain lost functions and reintegrate into the community. Previous studies have reported the positive effects of mental imagery (MI) on learning.[1,2] Mental imagery involves memory retrieval, and the generation and maintenance of images.[3] It is believed that generating the image, 'seeing the performance of the behaviour with the mind's eye', prior to performance of the task, activates neural substrates that are subsequently involved in the actual performance of the task. This effect is thought to facilitate the planning and execution of the task, thereby increasing the level of independent task performance.[1,2]

Mental imagery has been applied to stroke rehabilitation to promote upper limb motor function and visual neglect. Our previous randomised controlled trial indicated that patients receiving 3 weeks of MI intervention performed daily tasks better than those receiving conventional rehabilitation.[1] These findings demonstrated that MI could enhance the relearning of lost functions, possibly via active control of the task performance.

Generalisation demands that a person modify, assimilate and apply the skills learned in one environment to fit another environment.[4] In the context of rehabilitation for people with brain injuries, the skills learned in hospital after a brain injury need to be generalised to a different environment. The extent to which skills learned in the hospital environment are generalised to the home environment contributes to the success with which the person reintegrates into the community and is able to lead a normal life.

This study investigated the benefits of an MI intervention to enhance performance of tasks in a novel environment for post-stroke patients. A randomised clinical trial was used to compare the generalisation of daily task performance across different environments using an MI intervention and a functional rehabilitation (FR) programme.

Methods

This study was conducted from July 2005 to June 2006.

Study design

This study adopted the same single-blind, randomised control design as our previous study.[1] Based on our previous results, a sample of 17 patients per treatment group was adequate for having an 80% likelihood (β=0.20) of detecting a 20% difference (α=0.05) in improvement between groups. After giving their informed consent, patients were randomised by drawing lots for either the MI or FR programmes. The relevant hospital ethics committee approved the study.

Patients

Thirty-four patients who had experienced a first acute stroke were recruited. Patients were included if they sustained unilateral cerebral infarction within the middle carotid artery system, were aged over 60 years, were independent in their daily activities before the stroke, were able to communicate effectively and were cognitively intact when assessed using a validated neurocognitive functioning test (Cognistat, Northern California Neurobehavioral Group, CA, US). One

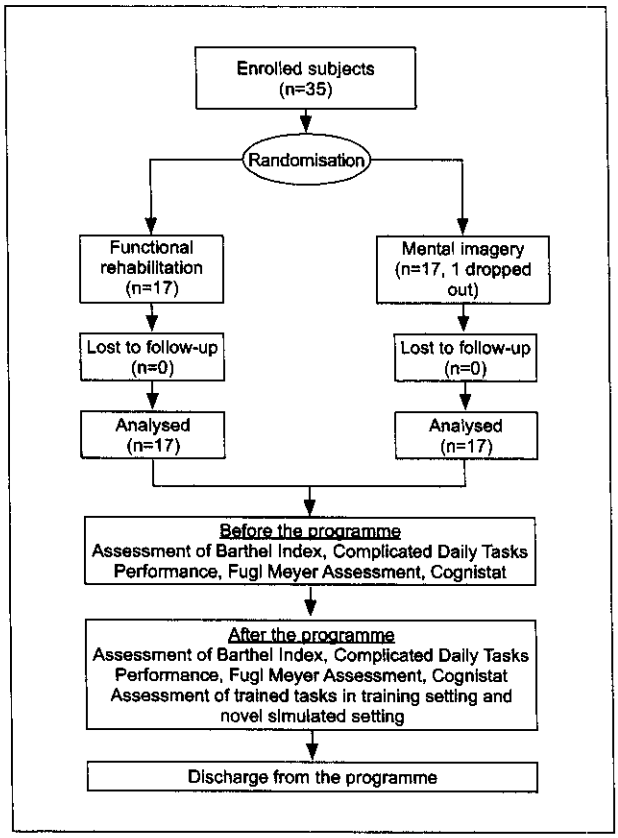

Fig . Flowchart of the trial

patient in the MI group dropped out after recruitment but before the intervention started because of persistent fever and unstable medical problems (Fig).

Intervention

The patients were treated within 3 days of being transferred from an acute hospital and within 1 month of the onset of their strokes. Patients in the MI group received 1 hour of MI per treatment and those in the FR group were given conventional occupational therapy. All treatment protocols were administered five times a week for 3 weeks (a total of 15 treatments). Patients in both groups received similar levels of therapist attention during their programmes. All patients had 1 hour of physical therapy daily that involved mobilisation, strengthening, and walking exercises.

All patients were trained to relearn 15 daily tasks. Five tasks with a similar level of difficulty were covered each week, progressing from the easiest to the most difficult. The MI intervention involved the patients' self-reflection on their abilities and deficits: mentally imagining, then actually performing, the task. The average time spent on MI and in actual practice was 30 minutes each. In the FR group, patients were given conventional occupational therapy using demonstration-and-practice methods to train them to perform the same 15 daily tasks. Experienced stroke rehabilitation therapists who had received training in the relevant techniques administered the MI intervention and FR programmes.

Table 1. Characteristics of patients in the functional rehabilitation (FR) and mental imagery (MI) groups*

Characteristics	FR (n=17)	MI (n=17)
Age (years)	68.1±10.5	70.4±9.8
Gender		
Male	12 (70.6)	9 (52.9)
Female	5 (29.4)	8 (47.1)
Days since stroke at inclusion	12.3±7.4	12.3±5.3
Location of stroke		
Left hemisphere	5 (29.4)	5 (29.4)
Right hemisphere	12 (70.6)	12 (70.6)
Barthel Index (score)	51.1±20.9	55.2±13.6

* Data are shown as mean ± standard deviation, or No. (%)

Outcome measurements

The patients' performance on the five tasks they had been trained was assessed in both the training environment (where the intervention had been provided) and a novel simulated environment (where 'real life' environments like home and community were simulated) to determine whether the skills learned could be generalised across environments. The task performance was rated using a 7-point Likert scale with '1' indicating 'complete dependence' and '7' indicating 'complete independence'. The inter-rater reliability ranged from 0.89 to 0.97; the assessors were blinded to the nature of the intervention. The Fugl-Meyer Assessment (FMA) of sensorimotor recovery after stroke[5] and the Cognistat were also assessed before and after the programme.

Statistics

Descriptive statistics were used to measure the patients' relevant characteristics. Multivariate analysis of variances (MANOVA) were used to compare the difference between the MI and FR groups in terms of the changes in the task performance scores before and after the training. The data analysis was conducted using the Statistical Package for the Social Sciences (Windows version 12.0; SPSS Inc, Chicago [IL], US).

Results

No significant differences were found in baseline values between the two groups (Table 1), indicating that they were homogenous in these measurements before treatment.

Performance of tasks in training and novel simulated environments

There were significant differences between the MI and FR groups in the task performance score changes before and after training in the training environment (P=0.02), with the MI group having higher performance score changes (Table 2). The univariate tests revealed significant differences in the 'fried vegetable with meat' (P=0.01), 'tidy table after meal' (P=0.02), and 'sweep floor' (P=0.02) tasks between the two

Table 2. Change in task performance scores before and after training between the functional rehabilitation (FR) and mental imagery (MI) groups*

Tasks	MI (n=17)	FR (n=17)
Training environment		
Fried vegetable with meat	1.5±1.9	-0.5±2.4
Tidy table after meal	1.6±1.5	-0.1±2.3
Sweep floor	2.2±1.6	0.4±2.6
Go to canteen	1.0±1.3	0.1±2.2
Go to park	1.4±1.8	0.9±2.0
Novel simulated environment		
Fried vegetable with meat	1.5±1.8	-0.5±2.3
Tidy table after meal	1.6±1.5	0.1±2.2
Sweep floor	2.6±1.8	0.6±2.3
Go to canteen	1.5±1.1	0.1±2.2
Go to park	1.4±1.6	-0.4±2.6

* Data are shown as mean ± standard deviation

Table 3. Fugl-Meyer Assessment—change in scores before and after training between the functional rehabilitation (FR) and mental imagery (MI) groups*

Fugl-Meyer Assessment	MI (n=17)	FR (n=17)
Upper limb	2.5±2.4	3.1±5.2
Wrist	1.3±1.9	1.1±1.6
Hand	0.8±1.6	1.9±1.9
Upper limb coordination	0.2±0.8	1.9±1.3
Lower limb	3.8±7.1	2.8±4.4
Lower limb coordination	0.9±1.7	1.0±1.8
Balance	2.8±2.4	2.5±2.8
Sensation	0.4±3.2	1.3±2.7
Passive range of motion	0.2±1.0	-0.9±2.7
Joint pain	-0.1±1.7	-0.6±2.7

* Data are shown as mean ± standard deviation

groups. No significant difference was found between the two groups in the 'go to canteen' (P=0.14) and 'go to park' (P=0.49) tasks.

There were significant differences between the MI and FR groups in the task performance score changes before training in the training environment and after training in the novel simulated environment (P≤0.05), with the MI group achieving higher performance score changes (Table 2). The univariate tests revealed significant differences in all five tasks between the two groups ('fried vegetable with meat' (P=0.008), 'tidy table after meal' (P=0.02), 'sweep floor' (P=0.01), 'go to canteen' (P=0.03) and 'go to park' (P=0.03).

Motor function: Fugl-Meyer Assessment of sensorimotor recovery after stroke

The results of the FMA are shown in Table 3. Higher scores indicate better motor function. The MANOVA of the change in pre- and post-programme scores showed that there was a significant overall effect (F (10, 23)=2.93, P=0.016). The FR group had a better performance than the MI group. Univariate results indicated significant between-group effects in upper limb coordination (P<0.001).

Table 4. Cognistat—change in scores before and after programme between the functional rehabilitation (FR) and mental imagery (MI) groups*

Cognistat	MI (n=17)	FR (n=17)
Orientation	0.2±1.1	0.2±1.4
Attention	0.0±0.0	0.2±1.2
Comprehension	0.0±0.0	0.2±0.6
Repetition	-1.4±2.7	-0.7±3.1
Naming	-0.2±1.2	1.7±0.7
Construction	0.1±1.6	0.5±1.4
Memory	0.8±2.2	0.5±2.1
Calculation	0.1±0.9	-0.1±0.7
Similarities	0.6±1.6	0.5±1.1
Judgement	0.2±0.7	0.1±0.8

* Data are shown as mean ± standard deviation

Cognitive function: Cognistat

The results of the Cognistat are shown in Table 4. Higher scores indicate better cognitive function. The MANOVA showed no significant difference between the groups (F (10, 23)=0.70, P=0.71). Univariate results indicated no significant between-group effects in changes in pre- and post-programme scores in all subscales.

Discussion

Effects of the mental imagery programme on task performance

To investigate the effect of MI training on stimulus generalisation, a task competence assessment was conducted in the training (familiar) environment and then repeated in a novel simulated environment. When compared with the training environment, the novel simulated environment should be more difficult and make more demands on patients as they had not yet come across these environments after sustaining their strokes. It should require more effort to generalise learned skills to the novel simulated environment. These tasks are what they would experience and carry out at home and in the community after discharge.

The results of the MANOVA on the pre- and post-training task performance score changes showed that the patients in the MI group scored significantly higher than those in the FR group in the novel simulated environments. This suggests that the patients who had received MI training were able to generalise what they had learned to the new situation better than the FR group. This finding is consistent with our previous findings that the patients in the MI group appeared to be able to relearn skills and tasks better.[1] Those in the FR group also showed general improvement in tasks tested in both training and novel simulated environments, but they performed less well than their counterparts in the MI group. As the patients in the FR group received the demonstration-and-practice method of task retraining, they might have found it difficult to copy exactly what was learned in the training environment when tested in a novel simulated environment. The MI approach is a better learning strategy for patients with strokes who might find it difficult to generalise the skills they have learned.

Our previous study showed that relearning daily tasks was more effective when active learning processes were involved.[1] Active learning refers to self-directed participation in the process of gaining skills and knowledge, using the techniques of chunking (to break down the task into steps) and self-regulation (to identify, correct and self-reflect on own problems). In a study of patients who had suffered global brain damage, active participation in motor training appeared to be a more effective way of enhancing performance than the use of a passive mobilisation protocol.

Patients in the MI group performed slightly better than those in the FR group in only three tasks in the training environment, but all five tasks were better performed in a novel simulated environment (Table 2). This means that generalisation of skills learned to novel simulated environment is found to occur more significantly in the MI group than in the FR group. It was expected that the training environment would be easier to deal with than the novel simulated environment to which the patients had not been exposed before. As the patients in the FR group received largely rote-learning methods for task retraining, they might have found it difficult to copy exactly what was learned in the training environment when tested in the novel simulated environment, especially in those tasks where environmental factors contributed markedly to the task difficulty as in 'go to park' or 'go to canteen'. This may be the reason that patients in the FR group performed less well in 'go to park' and 'go to canteen' in the novel simulated environment than patients in the MI group. As the novel simulated environment resembled patients' homes or communities, patients in the MI group might have applied chunking to identify the task demands and self-regulation to identify possible problems, and hence solutions, and then MI to collate information about the task demands and the patient's physical abilities. This could be the reason that patients in the MI group performed better than those in the FR group in the novel simulated environment.

Patients in the FR group performed the task 'go to park' significantly worse in the novel simulated environment (from 4.5 to 3.2). In contrast, the patients in the MI group maintained their performance level at 4.6. This further substantiates the proposition that MI can enhance skills generalisation, which is essential for task performance in the outdoor environment. This is particularly important when the environment is more unpredictable and continuously changing, such as when community facilities and shopping areas are being refurbished or remodelled. Our results suggest that the patients who were trained in the MI programme developed useful strategies for dealing with new situations. Positive and successful experiences give these patients more confidence when exposed to new environments and enable them to become more adaptive. In comparison, patients in the FR group might be less adaptive to different environments. The conventional FR approach used in rehabilitation might help them to relearn lost functions but may not adequately equip them with the skills needed for community reintegration.

With the help of chunking and self-regulation to facilitate the learning of the lost discrete skills after brain injury, the effectiveness of MI is enhanced by enabling individuals to mentally practise the task with corrected methods that are permitted by the bodily constraints caused by the brain injury. Motor planning for the task performance can therefore be maintained. During stimulus generalisation, MI helps to transfer the established behaviour to another setting through mental practice of the behaviour within the context of another setting. This helps the individual to plan the task and adapt to the different environment while mentally practising the task. Mental imagery helps to transfer the behaviour even under the possibly distracting stimuli in another setting. This enhances the task performance with the realisation of bodily constraints and differences in environment. Mental imagery therefore helps to facilitate the re-establishment and synchronisation of relevant behaviour with the realisation of bodily constraints caused by brain injury.

Effects of mental imagery on the Fugl-Meyer Assessment of sensorimotor recovery after stroke and Cognistat

All patients showed significant improvement in the basic functional outcome measure, the Barthel Index. As indicated from the overall score, they changed from requiring moderate assistance in most self-care tasks to requiring only minimal assistance. As with task performance, the patients in the MI group had better scores than the FR group after the programme. The lack of significant difference in the improvement between the two groups could be attributed to a possible ceiling effect on performance.

Generally, all patients showed improved motor function after training, as reflected by their FMA scores. Patients in the MI group had significantly better improvements in 'upper limb coordination'. This result contrasts with previous findings on improvement of motor performance; this might be due to differences in the nature of the imagery programmes. Page et al[6] used a motor imagery programme where subjects performed imagery of motor movement. Our study focused more on training the patients to perform daily tasks by incorporating their own dysfunction into it. This might explain why patients in the MI group did not have better FMA scores than those in the FR group.

In our previous studies,[1,2] we postulated that the MI programme would enhance the patients' attention and sequential processing. In the present study, there was no significant difference between groups on all subscales of the Cognistat. These results seem to contrast with our previous findings,[1] but this might be due to the relative insensitivity of Cognistat as a measure of attention. Cognistat is used more often as a mental screening tool.

Conclusions

This study provides evidence of the positive effects of the MI for improving patients' generalisation of task performances to new environments. It offers further evidence concerning the role of active control, which can be mediated by MI to enhance the relearning potential of people with stroke. Although MI seems to improve patients who are cognitively intact (as in those recruited for this study), strategies to further enhance the use of MI in patients with different profiles and ability levels are worth investigating. Moreover, the length of the programme could be further investigated so that it may be modified to fit the needs of specific rehabilitation programmes. This study only looked at the outcome immediately after the programme. The carry-over effect, which is important to a patient's reintegration into the community after discharge from hospital, is also important, and this will require further investigation. The positive effect of MI shown in both this and previous studies indicates that it is worth looking at the effectiveness of MI in terms of more global outcomes, such as quality of life and integration into daily life.

Acknowledgements

This study was supported by the Health Services Research Fund (HSRF: 03040051), Food and Health Bureau, Hong Kong SAR Government. The authors would like to thank the doctors, therapists, and nurses in the Department of Neurology, Tung Wah Hospital, Hong Kong, and all the participants for their support. Results on generalisation of task performance of this study were published in full in the Stroke: Liu KP, Chan CC, Wong RS, et al. A randomized controlled trial of mental imagery augment generalization of learning in acute poststroke patients. Stroke 2009 Apr 23. [Epub ahead of print]

References

1. Liu KP, Chan CC, Lee TM, Hui-Chan CW. Mental imagery for promoting relearning for people after stroke: a randomized controlled trial. Arch Phys Med Rehabil 2004;85:1403-8.
2. Liu KP, Chan CC, Lee TM, Hui-Chan CW. Mental imagery for relearning of people after brain injury. Brain Inj 2004;18:1163-72.
3. Kosslyn SM, Thompson WL, Shephard JM, et al. Brain rCBF and performance in visual imagery tasks: Common and distinct processes. Eur J Cogn Psychol 2004;16:696-716.
4. Alberto PA, Troutman AC. Applied behaviour analysis for teachers. Englewood Cliffs, NJ: Merrill, Prentice Hall; 1995.
5. Fugl-Meyer AR, Jaasko L, Leyman I, Olsson S, Steglind S. The post-stroke hemiplegic patient. 1: a method for evaluation of physical performance. Scand J Rehabil Med 1975;7:13-31.
6. Page SJ, Levine P, Sisto S, Johnson MV. A randomized efficacy and feasibility study of imagery in acute stroke. Clin Rehabil 2001;15:233-40.

SYS Wong 黃仰山

Effect of mindfulness-based stress reduction programme on pain and quality of life in chronic pain patients: a randomised controlled clinical trial

Key Message

A mindfulness-based stress reduction programme may not be superior to an education programme in terms of improving disability and pain in patients with a moderate degree of chronic pain.

Hong Kong Med J 2009;15(Suppl 6):S13-4

Department of Community and Family Medicine, The Chinese University of Hong Kong
SYS Wong

HSRF project number: 03040441

Principal applicant and corresponding author:
Prof Samuel Yeung-shan Wong
4/F, Department of Community and Family Medicine, The Chinese University of Hong Kong, School of Public Health, Prince of Wales Hospital, Shatin, NT, Hong Kong SAR, China
Tel: (852) 2252 8774
Fax: (852) 2606 3500
E-mail: yeungshanwong@cuhk.edu.hk

Introduction

Chronic pain is a prevalent health problem and a frequent cause of disability and suffering. It is also associated with significant health care costs. Although psychological interventions are alternatives to traditional medical approaches, many individuals with chronic pain do not benefit from these treatments.

Mindfulness-based stress reduction (MBSR) is a clinical programme to increase self-acceptance coping and reduce suffering in patients with medical illness using mindfulness meditation as a self-regulated approach for stress reduction and emotion management. Preliminary evidence demonstrated that MBSR may reduce pain and improve mood symptoms. However, no definitive conclusion could be drawn as no randomised controlled trial with an active control group had been carried out. The objective of this trial was to compare the effectiveness of MBSR with an education programme in terms of reduction of pain and improvement in quality of life for chronic pain patients.

Methods

This study was conducted from October 2006 to September 2007. A total of 100 participants were recruited from primary care, geriatric and pain clinics in the community and hospitals that most chronic pain patients attended.[1] Patients included were aged 18 to 65 years, with any chronic pain for at least 3 months. The pain had to be moderate to severe (scoring at least 4 out of 10 in an 11-point Numeric Rating Scale) verified by a trained research assistant and confirmed by a family physician. The patients had to agree not to receive other new treatments (including topical, over-the-counter, and non-pharmacological medication) during the intervention. Patients were excluded if they (1) received concurrent treatment other than medications for pain or psychological symptoms, (2) had a concurrent diagnostic and statistical manual of mental disorders axis-I diagnosis, (3) participated in an MBSR group, engaged in current or prior practice of meditation or relaxation techniques including MBSR, or (4) were illiterate and unable to complete the meditation diary. All participants gave written informed consent, and the study was performed according to the Good Clinical Practice guideline. This trial was also registered with the Centre for Clinical Trials of the Chinese University of Hong Kong, and was approved by the ethics committee of the university.

Study instruments

Outcome measures were collected at baseline, 8 weeks (end of intervention), 3 and 6 months after the intervention. Primary outcome measures were self-reported pain intensity measured by the 11-point Numeric Rating Scale[2] and the Dual Visual Analogue Sensation of Pain and Distress Scales.[3] Both scales have been demonstrated to be reliable and sensitive measurements of pain. Secondary outcome measures were mood status and symptoms assessed using the Profile of Mood States, the validated Chinese version of the Centre for Epidemiological Studies-Depression Scale, and the State Trait Anxiety Inventory. Health-related quality of life was measured by the validated Chinese version of the Short-Form

Health Survey (SF-12).

Results

Before intervention, patients in both the MBSR and education programme groups did not differ with regard to demographics, pain intensity, mood symptoms, health-related quality of life scores, the amount of sick leave taken, or the use of services and analgesics. After intervention, patients in both groups had significant improvements in pain intensity, which was sustained until 6 months post-intervention.

There were no significant differences in the SF-12 scores between the two groups at baseline, 8 weeks, and 3 and 6 months post-intervention. At 3 months after intervention, physical and mental component scores of SF-12 improved significantly in both groups. Nonetheless, only the physical component score improved further at 6 months post-intervention. There was a significant difference in the Profile of Mood States activity subscale between the two groups at the end of intervention, but the difference was not sustained thereafter.

The mean anxiety state scores of both groups improved 2.4 (95% confidence interval [CI]=0.3-4.5, P=0.027) at 3 months and 3.1 (95% CI=1.9-4.3, P=0.005) at 6 months post-intervention, compared with baseline scores. There were no significant differences between the two groups at baseline, 8 week, and 3 and 6 months post-intervention. Depressive symptoms (according to the Centre for Epidemiological Studies-Depression Scale) were not significantly different between the two groups and did not change over time.

Discussion

The randomised clinical trial design was used to study the effects of MBSR on chronic pain intensity with an active control group that could be adjusted for the confounding effects of group attention and therapist time. The effects of MBSR on chronic pain in a non-Caucasian population were also studied. The MBSR programme was not superior to multidisciplinary education programme based on the principles for management of chronic pain. We could not show that MBSR was not effective per se for improving quality of life or some of the mood symptoms, as we observed significant improvement in both groups.

There were several limitations to this study. First, the unexpectedly high dropout rate in the MBSR group and the low proportion of subjects who completed all 10 sessions might have contributed to the negative results of this intervention. As a result, the study could have had a type-II error. Second, for the MBSR group, only a proportion of subjects practiced daily for the recommended amount of time. Thus, MBSR might not be effective for those who attended the class only. If all those who attended the class also practised daily at home as instructed by the therapist, the results could have been different.

Acknowledgements

This study was supported by the Health Services Research Fund (#03040441), Food and Health Bureau, Hong Kong SAR Government. The authors thank the intervention group instructors and the patients who participated in this study.

References

1. Ng KF, Tsui SL, Chan WS. Prevalence of common chronic pain in Hong Kong adults. Clin J Pain 2002;18:275-81.
2. Jensen MP, Karoly P, O'Riordan EF, Bland F Jr, Burns RS. The subjective experience of acute pain. An assessment of the utility of 10 indices. Clin J Pain 1989;5:153-9.
3. Von Korff M, Jensen MP, Karoly P. Assessing global pain severity by self-report in clinical and health services research. Spine (Phila Pa 1976) 2000;25:3140-51.

CM Schooling 舒 菱
LL Hui 許麗玲
SSL Leung 梁士莉
LM Ho 何禮明
KH Mak 麥國恒
GM Leung 梁卓偉

Short- and medium-term outcomes of accelerated infant growth in a Hong Kong Chinese birth cohort

Key Messages

1. In a large, population-representative, Chinese birth cohort, higher birth weight and rapid growth, particularly at 0-3 months, were associated with higher body mass index (BMI) at 7 years.
2. Boys born heavy who had grown fast had the highest BMI, but rapid growth had the largest impact in lighter-born boys.
3. Rapid growth at 0-3 months or 3-12 months was not associated with a compensatory lower risk of serious infectious morbidity.
4. The ability to grow fast may be an embodiment of good health status rather than fast growth being causally protective.

Hong Kong Med J 2009;15(Suppl 2):S17-21

Department of Community Medicine and School of Public Health, The University of Hong Kong
CM Schooling, LL Hui, LM Ho, GM Leung
Family Health Service, Department of Health
SSL Leung
Student Health Service, Department of Health
KH Mak

HHSRF project number: 03040771

Principal applicant:
Prof GM Leung
Corresponding author:
Dr C Mary Schooling
Department of Community Medicine and School of Public Health, Li Ka Shing Faculty of Medicine, 21 Sassoon Road, Pokfulam, Hong Kong SAR, China
Tel: (852) 3906 2032
Fax: (852) 2855 9528
E-mail: cms1@hkucc.hku.hk

Introduction

Cardiovascular and metabolic diseases are leading causes of death and are becoming more prevalent in Asia. These diseases are increasingly seen within a framework where causation extends over the entire life and where humans work with a limited resource base and are forced to trade-off certain life-history parameters against each other, such as a strategy which promotes survival up to reproductive age against long-term health.[1] Until very recently one of the key components of early survival was resistance to infection.

Despite two decades of intensive research, the role of foetal and infant growth in metabolic and cardiovascular diseases remains controversial. Although much attention has been focused on low birth weight as the causative factor, evidence from experiments designed to test this hypothesis have highlighted the role of nutrition-driven post-natal growth as a possible missing link in the observed relation between birth weight and adult metabolic disease. To date, observational evidence in humans suggests that higher birth weight and faster infant growth are associated with childhood obesity,[2] and hence long-term risk. Although premature cardiovascular disease is more common in men, there has been little examination into whether birth weight or infant growth (singly or jointly) has different effects depending on sex. Less attention has also been paid to other potential positive outcomes of rapid infant growth, despite a cultural preference for 'fat' babies, particularly in locations such as China. One previous study has considered the potentially complimentary survival advantage of rapid infant growth. Faster infant growth was associated with a lower risk of serious infectious morbidity and possibly mortality.[3] The impact of infant growth on health is also less well understood in developed, non-western settings, such as Hong Kong, where birth weights are typically lower and there has been a history of rapid economic development. However, such populations may act as a sentinel for other rapidly developing locations.

Identifying optimal growth trajectories potentially has major public health implications. Using data from a large population-based, prospective Chinese birth cohort, we investigated the relation between infant growth rate and two complimentary outcomes: childhood adiposity and serious infectious morbidity.

Methods

This study was conducted from October 2005 to January 2007. The 'Children of 1997' birth cohort was initiated by the Department of Community Medicine, the University of Hong Kong and the Department of Health, of the Hong Kong SAR Government.[4] The sampling frame consisted of all infants born in April and May 1997 and brought to one of any of the 47 Maternal and Child Health Centres (MCHC) for their first postnatal visit. For the index year, 92% of infants born in Hong Kong visited the MCHC, which provides free-of-charge preventive care and immunisations, at least once. The study recruited 8327 mother-infant pairs, corresponding to 88% of all births in the recruitment period.

Mothers were approached at the MCHCs a few days after delivery for recruitment and baseline data collection, and were further followed up at 3, 9

and 18 months after birth. Mothers provided information on socio-demographics (age, parental education level, employment status and type of housing), mode of delivery, parity, breastfeeding and household smoking habits via a standardised self-administered questionnaire in Chinese. In addition to this prospectively collected data, in 2005-6 record linkage was used to obtain:

- Infant growth from the MCHC hardcopy records linked by MCHC number.
- Childhood weight and height from the Student Health Services (SHS) linked by birth certificate number. The SHS provides an annual examination at no cost to all students in any Hong Kong primary or secondary school.
- Lifetime public hospital use from the Hospital Authority (HA), which provides 94% of hospital care in Hong Kong, linked by birth certificate number.

All birth cohort members have a MCHC number and 97% have a birth certificate number. When the birth certificate number was missing, matching was by name, sex and date of birth, because there are only about 55 sex-specific births per day in Hong Kong. All potential matches were checked by the research team.

Exposure: growth rates

Infant growth rate was defined as change in weight z-score at 0-3 months and 3-12 months. Weight z-score was calculated relative to the 2006 World Health Organization growth standards for the exact age on the day of measurement. The closest measurements to 3 months (within 2 to 4 month) and 12 months (within 9 to 15 months) were used.

Outcomes

Childhood adiposity

Adiposity at about age 7 years was proxied by body mass index (BMI) z-score relative to the 2000 US Centers for Disease Control and Prevention growth references for the exact age on the day of measurement. The closest measurement between 5.5 and 8.5 years was used.

Serious morbidity

Serious morbidity was proxied by number of in-patient admissions to any public hospital in Hong Kong from the age of 3 months (or 12 months for growth at 3-12 months) to 8.0 years. Admissions were classified as respiratory infections, all infections, accidents and all other causes using the International Classification of Diseases 9, Clinical Modification (ICD9-CM), of the primary discharge code. Cohort members without any record of hospital admission were assumed to have no hospital admission.

Statistical analyses

Initial analysis of the association between infant weight growth rate and childhood adiposity revealed that the associations with 0-3 month growth rate were not consistent by birth weight (P-value for interaction 0.001) or sex and birth weight (P-value for interaction 0.007). We used multivariable linear regression to assess the association of growth rate tertile, initial weight tertile (ie at start of the period) and sex with childhood BMI z-score, adjusted for gestational age (complete weeks based on date of the last menstrual period) and growth rate in the other period (as a continuous variable). Other potential confounders such as birth order, infant feeding, parental education and maternal smoking changed the estimates by less than 5% and were not included in the model.

There was no evidence that the association between either growth rate and hospital admission differed by sex or initial weight. We used multivariable negative binomial regression to calculate the relative risk of admission by growth rate tertile in each period. We adjusted for initial weight, growth rate in the other period, gestational age, sex and parental education. We additionally adjusted for disease status, ie congenital or other life-long conditions that might affect infant growth or risk of infection. Children born in private hospitals had higher socio-economic status and were more likely to use private hospitals. We also adjusted for hospital type at birth (private or public) to correct for the probable greater use of public hospitals by children from less-advantaged families. Birth order, breastfeeding and housing changed the estimates by less than 5% and were not included in the model.

The University of Hong Kong–Hong Kong Hospital Authority West Cluster Joint Institutional Review Board and the Ethics Committee of the Department of Health, Government of Hong Kong SAR approved the study.

Results

We linked 7999 of the birth cohort (96%) with the MCHC records, 7809 (94%) with the SHS records and 3746 (45%) with the HA records; not all children were expected to have a hospital admission by the age of 8 years.

Of the surviving 7832 full-term births, 7153 had weight growth rates for 0-3 months and 6874 for 3-12 months. Faster growth was more common in infants with lower birth weight, lower gestational age and more socio-economically advantaged families (Table).

Higher initial weights and higher growth rates were associated with higher childhood BMI (Fig 1). The heaviest born children with the fastest growth rate from 0-3 months had the highest BMI at 7 years, but rapid growth at 0-3 months had a greater impact on BMI in lighter-born boys.

Growth rates were not associated with admissions for respiratory infections, all infections or accidents (Fig 2). Slower growth at 0-3 months was associated with admission for other causes.

Discussion

Consistent with findings elsewhere,[2] in this understudied

Table. Baseline characteristics by growth rate tertile at 0-3 and 3-12 months for term subjects in the Hong Kong 'Children of 1997' birth cohort

Characteristics	Growth rate tertile, 0-3 months (%)				Growth rate tertile, 3-12 months (%)			
	No.	Slow (n=2483)	Medium (n=2453)	Fast (n=2217)	No.	Slow (n=2343)	Medium (n=2327)	Fast (n=2204)
Sex								
Male	3766	34.9	34.4	30.6	3633	37.7	31.9	30.4
Female	3387	34.5	34.2	31.4	3241	30.0	36.1	33.9
Birth weight								
1st tertile	2169	14.6	32.4	53.0	2101	27.2	33.6	39.2
2nd tertile	2568	32.8	37.5	29.6	2460	33.8	33.7	32.5
3rd tertile	2416	54.8	32.5	12.7	2313	40.6	34.3	24.1
Size for gestational age								
Small	702	12.0	27.6	60.4	681	26.0	31.9	42.1
Appropriate	6451	37.2	35.0	27.8	6193	35.0	34.1	31.0
Gestational age (weeks)								
37-39	4376	30.2	33.9	36.0	4203	32.5	33.1	34.4
40	1787	40.0	35.5	24.6	1722	36.1	34.3	29.6
≥41	990	45.4	34.0	20.6	949	37.3	36.4	26.3
Birth order								
1	3268	33.5	35.6	30.9	3175	29.4	34.6	36.0
2	2858	34.7	33.2	32.1	2726	38.4	33.1	28.5
3+	768	40.4	33.5	26.2	730	39.0	33.7	27.3
Mother's age (years)								
<24	882	32.0	36.3	31.8	826	35.5	31.6	32.9
25-29	2212	35.0	34.9	30.2	2119	33.6	33.8	32.6
30-34	2722	34.5	34.2	31.3	2633	34.3	34.0	31.7
35-39	1162	36.5	31.8	31.8	1123	33.8	34.9	31.3
40-44	131	36.6	37.4	26.0	130	33.1	33.9	33.1
≥45	8	25.0	12.5	62.5	8	50.0	50.0	0
Breastfeeding for 4 weeks								
No	4255	35.8	34.6	29.6	4093	33.8	33.7	32.5
Yes	2591	32.9	34.2	32.8	2508	34.6	34.3	31.1
Highest parental education attainment								
9th grade or below	2077	38.1	34.0	27.9	1914	37.8	34.0	28.3
10-11th grade	2999	35.3	34.6	30.1	2912	32.7	33.9	33.5
12th grade or above	1867	30.2	34.4	35.4	1805	32.6	33.8	33.6
Housing								
Public	3039	36.5	34.2	29.4	2895	36.0	33.3	30.7
Private	3840	33.5	34.4	32.1	3721	32.7	34.4	32.9
Birth hospital								
Public	5057	36.8	34.3	28.9	4839	34.4	34.2	31.4
Private	2049	29.5	34.3	36.2	1988	33.6	33.1	33.4
With congenital conditions								
Yes	106	49.1	33.0	17.9	101	26.7	38.6	34.7
No	7047	34.5	34.3	31.2	6773	34.2	33.8	32.0

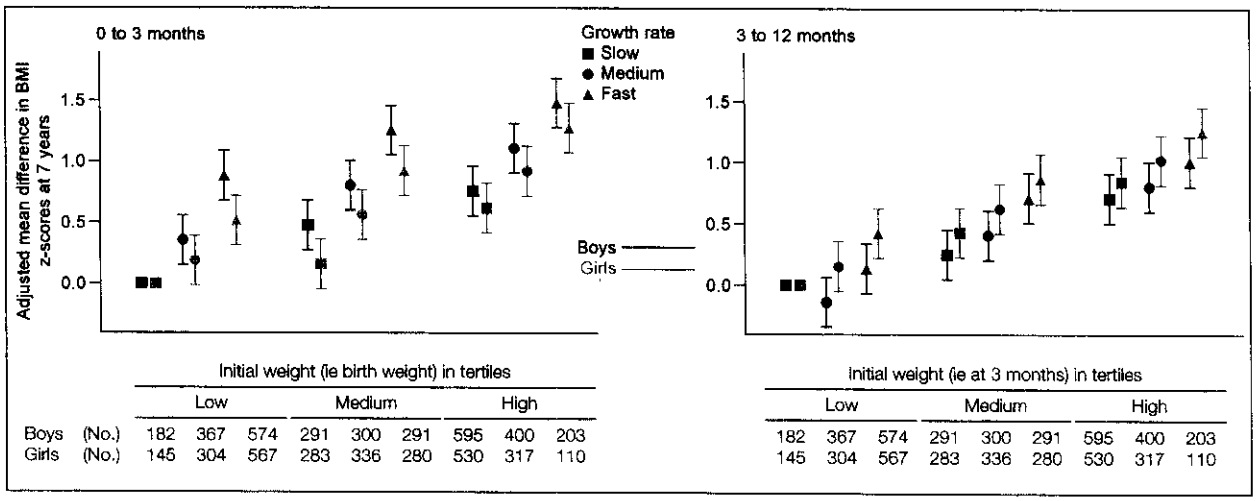

Fig 1. Adjusted* mean difference with 95% confidence intervals in body mass index (BMI) z-score at 7 years jointly by tertiles of initial weight and growth rate at 0-3 months and 3-12 months in boys and girls

* Adjusted for gestational age and growth rate in the other period

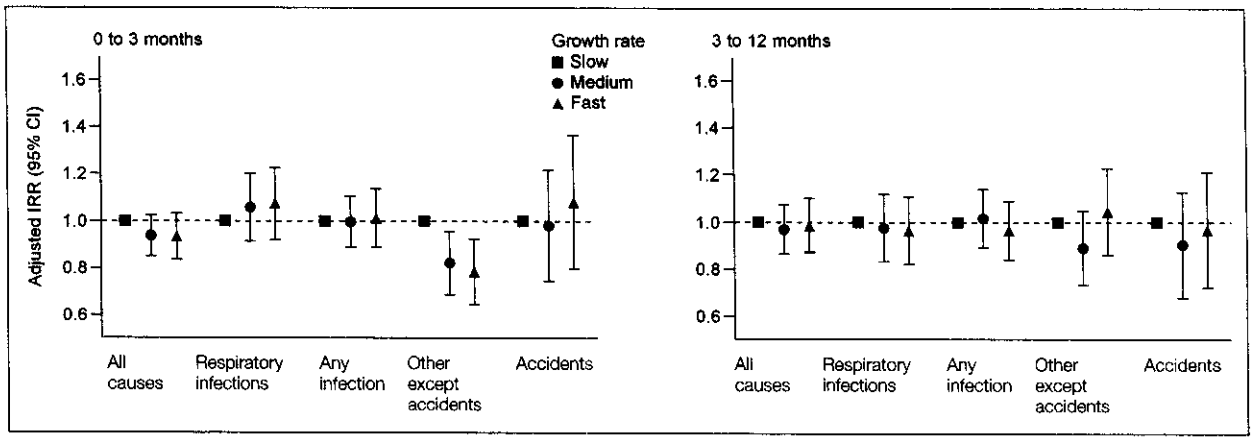

Fig 2. Adjusted* incidence rate ratio (IRR) with 95% confidence intervals (CIs) for number of hospital admissions by cause† and growth at 0-3 months and 3-12 months

* Adjusted for initial weight, growth rate in the other period, gestational age, sex, parental education, birth hospital and disease status

† Respiratory infections: ICD9-CM 033, 034.0, 381-382, 460-466, 477, 480-487 and 493; any infections: ICD9-CM 001-009, 033, 034.0, 381-382, 460-466, 477, 480-487, 493 787.91, 599.0, 780.6 and 780.3; accidents: ICD9-CM 800-999; and other except accidents: all other ICD9-CM except the above

population with scarce appropriate data, higher birth weight and faster infant weight growth were associated with higher BMIs at 7 years. Fast growth at 0-3 months was more strongly associated with higher BMI in boys born light, but not girls born light. Infants born light were also more likely to grow fast than heavier born infants. Nevertheless, the relatively small number of infants of either sex born heavy who grew fast had the highest BMI at 7 years. In contrast, rapid infant growth was not associated with a lower risk of admission for infections, but was associated with a lower risk of admission for causes other than infections or accidents. As such our study does not provide evidence that better immunity is a developmental trade-off for later metabolic risk resulting from fast infant growth. It does, however, suggest that maximal growth may not be optimal for metabolic risk.

Our study concerned a large, representative, population-based birth cohort, but had limitations. First, greater muscle mass and heavier build may explain some of the higher BMIs in high-birth-weight babies. However, muscle mass or build is unlikely to explain the differences in BMI by infant growth rate. Second, our cohort was largely fed formula milk; the impact of growth could be different in exclusively breastfed babies. Third, children with rapid infant growth may have been more likely to use private hospitals, so we cannot rule out the possibility that rapid infant growth increased the risk of hospital admission. However, we can be more confident that there was no protective effect of fast growth against serious infectious illnesses.

Most investigations into the effects of faster infant growth on metabolic risk has been from the perspective of infant growth as an outcome of, or in combination with detrimental restricted intrauterine growth. A detrimental effect of faster infant growth regardless of birth weight requires a different perspective. Disruption of hypothalamic circuit development and leptin regulation by early over-feeding could result in poorer appetite control in later life.[5] Leptin levels may also be suppressed by androgens, and hence be relevant to the differences between boys and girls.

Given the lack of benefit associated with fast growth, it is possible that traditionally valued fast infant growth (or fatness) is a marker of underlying health state, rather than a protective response to poor foetal growth. Faster growth at 0-3 months was associated with less risk of admissions for causes other than infections and accidents, of which over 50% were related to congenital anomalies, which would not always be immediately apparent.

Acknowledgements

The original study in 1997 was supported by the Health Care and Promotion Fund (HCPF: 216106), Food and Health Bureau, Hong Kong SAR Government. This study was supported by the Health and Health Services Research Fund (HHSRF: 03040771), Food and Health Bureau, Hong Kong SAR Government. We thank the Family Health Service, Department of Health and Hospital Authority of the Government of Hong Kong SAR for collaborating on the study and facilitating the recruitment and follow up of subjects. We also thank Keith Tin and Eileen Yeung for providing assistance in data extraction.

Parts of the results of this study have been published in: Hui LL, Schooling CM, Leung SS, et al. Birth weight, infant growth, and childhood body mass index: Hong Kong's children of 1997 birth cohort. Arch Pediatr Adolesc Med 2008;162:212-8.

References

1. Van Bodegom D, May L, Meij HJ, Westendorp RG. Regulation of human life histories: the role of the inflammatory host response. Ann

NY Acad Sci 2007;1100:84-97.
2. Baird J, Fisher D, Lucas P, Kleijnen J, Roberts H, Law C. Being big or growing fast: systematic review of size and growth in infancy and later obesity. BMJ 2005;331:929.
3. Victora CG, Barros FC, Horta BL, Martorell R. Short-term benefits of catch-up growth for small-for-gestational-age infants. Int J Epidemiol 2001;30:1325-30.
4. Lam TH, Leung GM, Ho LM. The effects of environmental tobacco smoke on health services utilization in the first eighteen months of life. Pediatrics 2001;107:E91.
5. Plagemann A. Perinatal nutrition and hormone-dependent programming of food intake. Horm Res 2006;65(Suppl 3):83S-89S.

SM McGhee 麥潔儀
JC So 蘇 正
GN Thomas

Explaining coronary heart disease trends in Hong Kong: creation of a model for policy and planning

Key Messages

1. The largest contribution of coronary heart disease (CHD) mortality reductions was from medical treatment.
2. A smaller contribution was estimated to be due to risk factors changes.
3. Improvement of treatment uptake levels can have a substantial effect in reducing CHD mortality.

Hong Kong Med J 2009;15(Suppl 2):S22-5

Department of Community Medicine, The University of Hong Kong
SM McGhee, JC So, GN Thomas

HHSRF project number: 03040851

Principal applicant and corresponding author:
Dr Sarah M McGhee
Department of Community Medicine, The University of Hong Kong, 5/F, William MW Mong Block, Li Ka Shing Faculty of Medicine, Pokfulam, Hong Kong SAR, China
Tel: (852) 2819 9193
Fax: (852) 2855 9528
E-mail: smmcghee@hkucc.hku.hk

Introduction

Coronary heart disease (CHD) is the most common cause of death in developed countries. The death rate due to CHD is increasing in most developing countries and is projected to become the leading cause of death in 2020 with over 7 million deaths each year. In Hong Kong, heart disease was the second highest cause of mortality in 2005 (after cancer) and accounted for about 10% of all deaths. In 2005, the crude death rate due to CHD in Hong Kong was approximately 60 per 100 000 inhabitants. Although this CHD mortality rate is lower than that in many western countries, it is still useful to examine the impact of therapies versus changes in risk factors on CHD mortality rates, in order to predict future trends.

Many large cohort studies have already identified trends in CHD, including the World Health Organization MONICA project and the Framingham study. However, in a number of countries including China, a further modelling approach using easily available data has been used to explain trends in terms of treatment or risk factor changes.[1] We sought to apply this model to Hong Kong.

Aim

The aim of the impact model project was to relate recent CHD trends to treatments and changes in population risk factors.

Methods

This study was conducted from October 2005 to September 2006. A Microsoft Excel cell-based model was used to examine CHD mortality in Hong Kong between 1989 and 2001, as the best quality data were collected in these years. The impact model was originally created for the UK[2] and has since been applied to many other countries. The main model used in Hong Kong was that developed for the US in 2005[3] but with modifications. The model was applied to males and females aged 25 to 84 years only. The age-group of 85 years and older was not included because of limited data.

Medical and surgical treatments

Population and mortality data were obtained from the Hong Kong Census and Statistics Department and the Department of Health respectively. Numbers of discharges and deaths were obtained from the Hospital Authority clinical data. Treatment prescription rates and case fatality data were based initially on the UK model. Data on the relative risk of each treatment were obtained from published controlled trials and meta-analyses that were also used in previous impact models. The prevalence of hypertension, community angina and heart failure cases were based on local publications. Overall patient compliance and adjustments for potential overlap between CHD patient groups were based on the same assumptions as in previous impact models.

Risk factors

Changes in major risk factors may also have contributed to changes in mortality rates for CHD. The classical risk factors included in this model were blood pressure, cholesterol, body mass index, smoking and diabetes. Other factors

Table 1. Deaths prevented or postponed by treatments in Hong Kong 1989-2001

Treatments	Deaths prevented or postponed	Minimum estimate	Maximum estimate
Acute myocardial infarction (AMI)	320	191	522
Treatments in effect 1989	-125	-40	-244
Total secondary prevention			
Secondary prevention after AMI	247	145	496
Treatments in effect 1989	-25	-8	-54
Secondary prevention after angioplasty	44	17	77
Chronic angina			
Unstable angina	10	7	18
Community angina	44	20	92
Heart failure			
Hospital heart failure	164	87	325
Community heart failure	0	-5	13
Hypertension and hyperlipidaemia treatment			
Hypertension	298	131	616
Treatments in effect in 1989	-155	-40	-401
Hyperlipidaemia	106	45	219
Total treatments			
2001	1233	637	2378
1989	-305	-88	-699
Treatments between 1989 and 2001	928	550	1678

such as physical inactivity were not included in this model since there were no reliable data. Data on risk factor prevalence were obtained from three local studies: China Light and Power study in 1990, Cardiovascular Risk Factor Prevalence (CRFP) study in 1995-96 and Population Health Survey (PHS) in 2003/2004.

Mant and Hicks correction

Multiple medications could be taken by individual CHD patients. However, the mortality reduction due to polypharmacy is unlikely to be simply the additive effect of each separate treatment. The cumulative effect was estimated by using the Mant and Hicks approach and separate relative risk reductions (RRRs) where: benefit = 1 - [(1 – RRR from treatment A) * (1 – RRR from treatment B) * … etc].

Sensitivity analysis

Sensitivity analysis was performed for each main assumption and estimate included in the model, such as uptake level, case fatality, and relative risk. Assumptions about maximum and minimum values were based on the highest or lowest values that could be obtained from internationally published studies. Otherwise, +/- 20% of the main parameters were used to generate the maximum or minimum possible for deaths prevented or postponed (DPP) for each treatment or risk factor.

Model validation

The number of DPP was estimated for each medication and cardiovascular risk in between 1989 and 2001, stratified by gender and age. This number was compared with the actual change in CHD mortality in the period, where the actual change was calculated as the number of deaths attributed to CHD in 2001 if the mortality rate stayed at the 1989 level minus the number of observed CHD deaths in 2001.

Results

Between 1989 and 2001, the actual mortality rates for CHD in Hong Kong in persons aged 25 to 84 years decreased from 79 to 76 per 100 000 in men and from 60 to 42 per 100 000 in women. The mortality rates were based on 3-year averages for the years 1988-90 and 2001-03 respectively. Using the population data and mortality rate in Hong Kong for 1989 and 2001, we estimate that there would have been 3928 CHD deaths expected in 2001 if the 1989 mortality rates had persisted, but only 2742 deaths were observed in 2001. Therefore 1186 CHD deaths (the actual fall) were prevented or postponed between 1989 and 2001.

Medical and surgical treatments

The model estimated that 1233 CHD deaths were prevented or postponed by medical and surgical treatments in 2001. After applying the Mant and Hicks correction and adjusting for treatments that were already used in 1989, there were 928 deaths estimated to be prevented or postponed by treatment between 1989 and 2001 (Table 1). Treatments for initial acute myocardial infarction (AMI), secondary prevention post AMI, as well as heart failure, hypertension and hyperlipidaemia treatments have contributed to a larger proportion of the mortality reductions; respectively estimated as 195, 221, 164 and 249 CHD deaths. Smaller contributions to DPP were estimated from secondary prevention post angioplasty (44 deaths) and treatment for chronic angina (54 deaths).

Risk factors

The changes in cardiovascular risk factors did not contribute a great deal to CHD DPP in Hong Kong between 1989 and 2001. Only 336 CHD deaths were prevented or postponed by changes in all major risk factors (Table 2). The largest contribution came from the decline in smoking prevalence, which prevented 328 CHD deaths. The decrease in mean

Table 2. Deaths prevented or postponed by risk factors in Hong Kong 1989-2001

Risk factors	Deaths prevented or postponed	Minimum estimate	Maximum estimate
Blood pressure	156	133	182
Hypertension treatments	-143	-	-
Risk factors minus treatment	13	0	156
Smoking	328	206	563
Cholesterol level	281	239	401
Cholesterol treatments	-177		
Cholesterol diet only	104	0	281
Obesity	47	34	61
Diabetes	-156	-115	-195
Risk factor total	336	125	866

diastolic blood pressure in men avoided 213 CHD deaths, while 57 more deaths were produced due to the increase in blood pressure in women. As 143 deaths were prevented by hypertension treatments, the total CHD deaths prevented by population blood pressure changes therefore decreases to 13 after adjustment. The decline in mean cholesterol levels resulted in 281 CHD DPP. However, 177 of these deaths were prevented by cholesterol treatments and only 104 by the change in cholesterol level. Decreased mean body mass index could have prevented 47 CHD deaths, 10 in men and 37 in women. Diabetes prevalence was the only risk factor that resulted in an overall increase in deaths. Increased diabetes prevalence resulted in 156 more CHD deaths.

Validation

The model estimated that a total of 1264 deaths were prevented or postponed between 1989 and 2001 compared to 1186 fewer deaths in reality. Of these, 78% of the actual reduction was attributable to treatment and 28% to risk factor changes. The model overestimated the deaths prevented or postponed and the overall model fit with actual changes in mortality is 106%—143% for men and 68% for women.

Sensitivity analyses

Sensitivity analyses showed that CHD deaths prevented or postponed were consistent among all medical treatments. The effects of all treatments together prevented 928 deaths, with a minimum of 550 and maximum 1678. All risk factor changes together prevented 336 deaths, with a minimum of 125 and maximum 866. By all risk factors changes, DPP showed a greater contribution for the maximum estimation when compared to the best estimation, which showed that DPP by risk factors may be underestimated in the model.

Discussion

As the most westernised city in China, Hong Kong has experienced a rise in CHD mortality one to two decades earlier than the remainder of China. The mortality rate for CHD in Hong Kong was still increasing in the 1970s and peaked around 1980. Although the crude death rate has remained fairly stable, age-standardised mortality has dropped substantially over the past two decades. However, the trends in mortality reduction were not similar to those in western countries. Mortality due to CHD in Hong Kong has remained low despite rapid economic growth. The mortality rate is about half of that observed in the US and UK. The influences of changes in treatments and risk factors on CHD mortality could therefore show a different effect.

Medical and surgical treatments

The advances in treatments have no doubt made a great contribution to preventing CHD mortality over the last 20 years. Some of the therapies such as statins and aspirin are very cost-effective in primary and secondary care. New surgical treatments such as angioplasty also became available over this period. Although the effect of medical treatments may be overestimated in the model, a large proportion of DPP was estimated to result from advances in treatment. However treatment uptake rates may have been relatively low for some therapies, possibly due to the cost of implementation, patients dying before arriving at hospital or the treatment not being offered. A UK study showed that improvements in uptake could make a large impact on the reduction of CHD mortality, which suggested that DPP by current treatments would be double if the uptake levels increase to 80%.[4] Thus, the effects of medical treatments in Hong Kong could be maximised if the future policies aim to improve treatment uptake of medications.

Risk factors

Only 28% of DPP was attributed to risk factor changes. The decline in smoking prevalence was attributed with the largest proportion of CHD mortality reduction among all the risk factors. A recent study proposed that the epidemic of tobacco in Hong Kong has entered an advanced period,[5] with cigarette consumption reaching a peak around 1970, 20 years later than the US, and started to decline as also observed in US. The smoking trend in Hong Kong was thus predicted to be repeating the US trend but with a two decade delay.

Mean diastolic blood pressures in Hong Kong have remained fairly stable between 1989 and 2001. However, mean systolic blood pressure was observed to increase in the same period, which is possibly due to ageing of the Hong Kong populations. Thus using diastolic blood pressure alone for calculating DPP may overestimate the real changes on mortality reduction by blood pressure.

The dietary and fat intake pattern in the local Chinese population appeared to be close to the recommended level for cardiovascular health,[6] suggesting unhealthy dietary patterns relating to fat consumption may not be a major determinant of CHD deaths. It is therefore unlikely that a large proportion of deaths from CHD could be prevented by a change of diet, at least when mediated through fat consumption. The estimated DPP associated with changes in mean cholesterol levels found over this period could be the effect of treatment. Therefore, it was assumed that the DPP due to change in cholesterol levels was mainly contributed by treatments and not lifestyle change.

Mean body mass index (BMI) for Hong Kong women has declined substantially since 1989, while the BMI for men was similar in 1989 and 2003. The decline in female BMI may be due to social pressure for a lower ideal weight for women or a consequence of including a higher proportion of middle-aged women who are employed in the data from the CRFP and PHS study, where employed middle-aged women tended to have a lower BMI than those staying at home.

Diabetes prevalence was the only risk factor that was observed to clearly increase over the study period. In the model, 156 CHD DPP were attributed to this change. The increase in diabetes among the Hong Kong population may be due to changes in lifestyle such as a decrease in physical activity.

In comparison with other countries, the low mortality rate from CHD in Hong Kong seems to be consistent with most Asian countries, except Singapore (despite having a similar level of economic development). Singapore is the only country in Asia in which the CHD mortality rate has reached the level of western countries. The difference in serum cholesterol concentrations would explain the difference in CHD mortality and could be related to the high fat intake. The Beijing model also attributed the large increase in CHD deaths in mainland China to a rise in cholesterol levels. Change in diet and other lifestyle factors from traditional Chinese to mixed modern Chinese and western patterns seems to be the main issue in changes in CHD mortality rates. It is possible that Hong Kong may experience these changes in the future if western diets continue to be popular among the younger age-groups, as indicated by the prevalence of obesity in Hong Kong children and current dietary practices.

Limitations

The impact model is highly dependent on the quality of data available. Few comprehensive studies could be found for CHD treatments and risk factors in Hong Kong, data had to be estimated using the UK and Beijing models and assumptions made in those models. Adjustments were made when possible to tailor the data for Hong Kong. Risk factor trend data were very limited in Hong Kong. The smoking trend was the only risk factor with very reliable data. For the other risk factors, only three large cohort studies were considered good enough to use in the model. This limitation of the data sources impeded delineation of trends in risk factors. Sensitivity analysis showed that the mortality reduction attributed to risk factor changes may contribute a larger proportion, as the model may have underestimated the risk factor changes in Hong Kong between 1989 and 2001 or possibly overestimated the DPP statistics due to medical treatment.

The results appear to predict more than the actual number of deaths reduced. However, the overall pattern is similar to the Beijing model, with larger contributions to mortality reductions by all medical treatments and a relatively small contribution from risk factor changes. Unlike the Beijing model, the Hong Kong model did not find an increase in deaths from risk factor changes. The Hong Kong model results fall between those for China and the US. Mortality due to CHD in Hong Kong is falling like that in the US, but locally the decline starts from a much lower peak mortality level.

Conclusions

Up to 78% of CHD mortality reduction between 1989 and 2001 was attributed to improvements in treatment while 28% was attributed to changes in population risk factors. The findings in Hong Kong were quite different to European studies, but similar to those observed in China. The CHD mortality rate in Hong Kong was already very low compared to western countries with similar levels of economic development. The model is consistent with improvements in treatment uptake and control of risk factors resulting in further CHD mortality reductions.

Acknowledgement

This study was supported by the Health and Health Services Research Fund (HHSRF: 03040851), Food and Health Bureau, Hong Kong SAR Government.

References

1. Critchley J, Liu J, Zhao D, Wei W, Capewell S. Explaining the increase in coronary heart disease mortality in Beijing between 1984 and 1999. Circulation 2004;110:1236-44.
2. Capewell S, Morrison CE, McMurray JJ. Contribution of modern cardiovascular treatment and risk factor changes to the decline in coronary heart disease mortality in Scotland between 1975 and 1994. Heart 1999;81:380-6.
3. Ford ES, Ajani UA, Croft JB, et al. Explaining the decrease in U.S. deaths from coronary disease, 1980-2000. N Engl J Med 2007;356:2388-98.
4. Capewell S, Pell JP, Morrison C, McMurray J. Increasing the impact of cardiological treatments. How best to reduce deaths. Eur Heart J 1999;20:1386-92.
5. Lam TH, Ho SY, Hedley AJ, Mak KH, Peto R. Mortality and smoking in Hong Kong: casecontrol study of all adult deaths in 1998. BMJ 2001;323:361.
6. Woo J, Leung SS, Ho SC, Sham A, Lam TH, Janus ED. Dietary practices and lipid intake in relation to plasma lipid profile in Hong Kong Chinese. Eur J Clin Nutr 1997;51:467-71.