

USING PATIENT CHARACTERISTICS TO OPTIMISE OUTCOMES IN THE PRE-HOSPITAL PHASE OF ACUTE CORONARY SYNDROMES IN BOTSWANA

Chokani-Namame, N.M. MA Cur graduate

University of South Africa
Department of Health Studies
MRI Botswana Ltd.
Gaborone,
Botswana

Ehlers, V.J. D Litt et Phil (corresponding author)

University of South Africa
Department of Health Studies,
P.O.Box 392
UNISA
0003

Corresponding author: ehlervj@unisa.ac.za

Hattingh, S.P. D Litt et Phil

University of South Africa
Department of Health Studies,
P.O.Box 392
UNISA
0003

ABSTRACT

The emergency treatment of patients with acute chest pain influences the immediate outcomes and the long-term prognosis. The characteristics of each individual experiencing an acute chest pain episode can influence the outcome. The purpose was to address these characteristics during health education sessions offered at schools, churches and workplaces to enhance the outcomes of acute chest pain episodes. Patient characteristics, as specified by the Synergy Model of Patient Care, (AACN, 2004), could influence the outcomes of severe chest pain episodes. Structured interviews were conducted with patients who had survived such episodes. Data were analysed according to the Synergy Model's eight patient characteristics, namely resiliency, vulnerability, complexity, resource availability, stability, predictability, participation in care and participation in decision-making.

The respondents lacked knowledge about the severity of acute chest pain, taking aspirin during such episodes, changing their lifestyles and the urgency of seeking medical assistance.

Keywords: acute chest pain, acute coronary syndrome, patient characteristics, pre-hospital emergency care, Synergy Model of Patient Care

Abbreviations

AACN - American Association of Critical-Care Nurses

AHA – American Heart Association

ACS – Acute coronary syndrome

AHA – American Heart Association

AMI – Acute myocardial infarction

MI – Myocardial infarction

MRIB Ltd - Medical Rescue International Botswana Limited

INTRODUCTION AND BACKGROUND INFORMATION

An estimated 900 000 people experience episodes of acute chest pain in the United States of America (USA) annually; 25% of them die and half of those who die never reach a hospital (Smeltzer, Bare, Hinkle & Cheever, 2008:874). Pre-hospital mortality occurs in many patients within the first hour of the onset of acute chest pain (Kucia, Taylor & Horowitz, 2001:186). The major manifesting symptom of acute coronary syndrome (ACS) is chest pain that occurs suddenly and continues to persist. “Patients may present with a combination of symptoms, including chest pain, shortness of breath, indigestion, nausea and anxiety. They may have cool, pale and moist skin. The heart rate and respiratory rate might be faster than normal” (Smeltzer et al., 2008:874). Any person experiencing acute chest pain, unrelated to trauma, should be treated as if he/she is experiencing an ACS episode, until a final diagnosis can be made.

According to Maganu (1996:5) Botswana, like other sub Sahara Africa countries, is undergoing a “health transition” comprising demographic, lifestyle and epidemiological transitions, with increased risks of ACS. The records of the call centre desk of Medical Rescue International Botswana Limited (MRIB Ltd) indicate that between January 2004 and June 2005, 105 calls were registered, from patients with acute chest pain unrelated to trauma (MRIB Ltd, 2004-2005). Of these patients 11 (10.5%) died at the incident scenes and the rest were transported to hospitals.

Definitions of key terms

Acute chest pain – Any chest pain, unrelated to trauma, severe enough for the patient or others to phone the MRIB.

Acute coronary syndrome (ACS) – refers to signs and symptoms that range from unstable angina to acute myocardial infarction (Smeltzer et al., 2008:859). During this study, no differential diagnosis was attempted.

Needs - refer to things identified as gaps between what is necessary and what is available for ACS patients, such as the need for supplying oxygen to limit myocardial infarction during an acute chest pain episode.

Patient characteristics – are typical features of a person (Hornby, 1994:188) described in terms of the Synergy Model’s eight major characteristics.

Patient outcomes – are the results of the acute chest pain episode, including recovery, morbidity and mortality.

Pre-hospital emergency care - is defined as the emergency care provided before arrival at a hospital.

The Synergy Model of Patient Care

The focus of this study was on the model’s eight patient characteristics namely: resiliency, vulnerability, complexity, resource availability, stability, predictability, participation in care and participation in decision-making.

Telephone triage – refers to nurses’ giving appropriate advice telephonically to the caller.

PROBLEM STATEMENT

The number of persons likely to experience acute chest pain episodes could increase in Botswana, as economic development progresses and persons’ lifestyles change. The research problem concerns identifying patients’ characteristics that could influence the potential outcome of acute chest pain episodes.

PURPOSE AND OBJECTIVES OF THE STUDY

The purpose of this study was to identify the characteristics of patients who had experienced episodes of acute chest pain in Botswana. The identified characteristics will be addressed in health education sessions at schools, churches and workplaces, that could help to improve outcomes for patients experiencing acute chest pain episodes.

With reference to the patient characteristics described in the Synergy Model, the research objectives for this study were to:

- identify and describe the characteristics of patients who had experienced episodes of acute chest pain in Botswana
- suggest ways of incorporating this knowledge in health education sessions for scholars, the lay public and workers, about managing chest pain episodes.

Significance of the study

Knowledge about these characteristics could help to optimise patients’ involvement in their care. Appropriate health education drives could enhance Botswana’s citizens’ knowledge about the required actions to take when acute chest pain occurs.

ETHICAL CONSIDERATIONS

Permission to conduct the study from Botswana's Ministry of Health (Research Unit) as well as permission from MRIB Ltd to access client records was granted. Permission was also granted by the Research and Ethics Committee of the Department of Health Studies, University of South Africa.

Informed consent was obtained from each respondent. The interviewer deleted each interviewee's details from the list of willing respondents to ensure that every interviewee was only contacted once. Subsequent to the acceptance of the research report the completed interview schedules were shredded and the data base on the computer was deleted.

No remuneration was paid to the respondents. No ill effects were incurred by refusing to participate or by refusing to answer specific questions.

RESEARCH DESIGN AND METHODS

A quantitative, exploratory, descriptive survey was used to describe the characteristics of patients who had experienced episodes of acute chest pain. The design was exploratory as no information could be traced about the characteristics of patients who had survived episodes of acute chest pain in Botswana. A descriptive and contextual research design allowed the respondents to describe situations and events within their natural contexts (Polit & Hungler, 1999:16-17, Burns & Grove, 1997:29).

Population

The population for this study comprised persons who had contacted the MRIB call centre because they had experienced acute chest pain episodes between 1 January 2004 and 30 June 2005, comprising 105 calls. Out of these 105 callers, 11 patients had died at the scene. Thus the remaining 94 (105 – 11) patients comprised the target population. Out of these 94 patients, only 44 (46.8%) could be traced who were willing to be interviewed. No sampling was done as all 44 persons comprising the accessible population were interviewed.

Research instrument

A structured interview schedule was designed. The interview schedule's two major sections requested demographic information (such as age, gender, occupation, income group, previous illnesses) and information about the Synergy Model's eight specific patient characteristics.

The structured interview schedule was pre-tested on four persons who had contacted the MRIB call centre for acute chest pain outside the study period and were thus excluded from the actual study. Each interview lasted 45-60 minutes. The data obtained from these four interviews during the pre-test phase were not analysed, but discussed with

other experts. No questions required rephrasing as all questions were understood by the interviewees.

Reliability and validity

Measures used to ensure reliability of the tool are stability, consistency and equivalence (Polit & Hungler, 2006:324). No discrepancies were found between the results from the pre-test and those from the actual interviews, indicating stability of the instrument. However, no tests of significance were performed to test the reliability. The manager of the MRIB call centre, and four nurses, who worked in emergency units, assessed the content validity of the instrument as pertaining to patients' characteristics during the pre-hospital acute chest pain situation. Criterion-related validity in this study could be accepted as every item addressed the patient characteristics specified by the Synergy Model. A statistician and two nurse researchers also agreed that every question relate to demographic information or to a specific patient characteristic.

Data collection procedure

Each respondent was requested telephonically to participate in the study, setting an appointment date, time and place for the interview. The interview schedule was completed anonymously.

Data analysis

The data were analysed using the SPSS version 12 computer program with a statistician's assistance. Responses to open-ended questions were grouped, counted and analysed quantitatively.

RESEARCH RESULTS

Demographic data

The mean age of the 44 respondents was 46.36, ranging from younger than 21 to older than 61, with 23 (52.4%) falling within the 41-60 and 7 (15.9%) within the 61+ year age ranges. Persons older than 40 years of age, complaining of chest pains, are more likely to suffer ACS than younger persons (Brieger, Eagle, Goodman, Steg, Budaj, White & Montalescot 2004:462; Fenton & Baumann, 2005:2; Hardin & Hussey, 2003:75).

There were more females (52.4%; n=23) than males (47.7%; n=21) and 59.1% (n=26) were married. Of the respondents 40.9% (n=18) had attained university qualifications, while 31.8% (n=14) had vocational training, 18.2% (n=8) had senior secondary school, 6.8% (n=3) had junior secondary school and 2.3% (n=1) had primary school education levels. The respondents' monthly earnings seemed to concur with their relatively high education levels because 47.7% (n=21) reported their monthly incomes to exceed

BP10 000; 15.9% (n=7) earned from BP5 000 to BP 9 999 and 18.2% (n=8) earned BP2 500 – BP4 999 and only 9.1% (n=4) earned less than R2 499 while 9.1% (n=4) failed to indicate their monthly incomes. (During the data collection phase 1BP was equivalent to R1.50 or US\$0.20).

Patient characteristics

Specific sections of the structured interview schedule requested information relevant to the eight patient characteristics specified in the Synergy Model.

Resource availability

The resources available to a patient with ACS symptoms include his/her knowledge, financial resources and social support rendered by family, friends and others, such as colleagues. Patient outcomes can be influenced by the adequacy, accessibility and appropriateness of his/her available resources.

Patients' knowledge

All 44 (100%) respondents experienced pain, with the area of pain identified as the chest by 93.2% (n=41); arms or shoulders by 13.6% (n=6); the neck or jaw by 11.4% (n=5) and on the back by 9.1% (n=4). Pain in the back, arms, shoulders, neck and jaw are atypical symptoms of ACS which might not be associated with ACS (Ryan, Devon & Zervic, 2005:34). Only 59.1% (n=26) of the respondents interpreted their pain symptoms as possible cardiac problems, indicating that 40.9% (n=18) might have failed to realise the potential life-threatening nature of the incident. According to Finn, Bett, Shilton, Cunningham and Thompson (2007:294), individuals' ability to relate their chest pain to the heart is the strongest predictive factor in patients' seeking help within 60 minutes. Failure to do so might be attributed to the misinterpretation of the symptoms, lack of knowledge, denial or rationalisation (Dracup & Moser, 1997:253).

Four triggers of cardiac infarction are awakening, anger, physical exertion and sexual activity (Strike, Perkins-Porras, Whitehead, McEwan & Steptoe, 2006). Out of the 44 respondents, 38.6% (n=17) were engaged in "other" non-specified activities, 38.6% (n=17) were resting and 22.7% (n=12) were working at the time of the onset of their acute chest pain.

The use of aspirin retards platelet adhesion, and therefore thrombus formation, and reduces mortality (Rubio & Jato, 2004:72; Shellack, 2004:99)). Only 9 (20.5%) of the 44 respondents knew that aspirin could relieve chest pain and prevent thrombus formation.

All 44 (100%) respondents could access health facilities, but only 47.7% (n=21) could access a heart clinic. Although all the respondents had accessed MRIB Ltd during their acute chest pain episodes, only 63.6% (n=28) knew the emergency telephone numbers. Most patients (90.9%; n=40) used ambulances to get to the nearest hospital. Where

ambulance services are dependable, it is preferable to use these as emergency care can be commenced en route to the medical facility, reducing the time lag from the onset of the acute chest pain episode to the commencement of treatment.

During their acute chest pain episodes, 52.3% (n=23) of the respondents had family members present while 18.2% (n=8) were with friends; 27.3% (n=12) were alone and 2.3% (n=1) were with strangers. Patients who are alone during an acute chest pain episode might face poorer outcomes (Dracup & Moser, 2000:270) than those with some form of social support during such a crisis.

Out of the 44 respondents, 38.6% (n=17) reportedly had a health checkup once per month, while 20.5% (n=9) did so annually and 40.9% (n=18) maintained that they also had health checkups at “other” intervals.

Vulnerability – risk factors

Vulnerability is the susceptibility to actual or potential stressors that may adversely affect patient outcomes (Steptoe & Marmot, 2003:1029). During an acute chest pain episode, the patient’s vulnerability will determine the required interventions.

Patients with diabetes, hypertension and cardiac conditions have higher risks, or increased vulnerability, for poor outcomes after an acute chest pain episode (AHA, 2008). Out of the 44 respondents, 29.5% (n=13) had hypertension, 9.1% (n=4) had diabetes, 9.1% (n=4) had known cardiac conditions and 11.4% (n=5) had other unspecified serious illnesses. Other risk factors which could adversely affect the vulnerability and the outcomes of an acute chest pain episode included that of the respondents:

- 11.4% (n=5) could not move without assistance
- 31.8% (n=14) weighed more than 80 Kg
- 25.0% (n=11) were smoking/had smoked previously
- 36.4% (n=16) used alcohol
- 47.8% (n=21) could not describe their diets
- 31.8% (n=14) took anti-hypertensive drugs
- 20.5% (n=9) reportedly had fair and 6.8% (n=3) poor coping abilities in stressful situations
- 86.4% (n=38) experienced fright during the acute chest pain episode
- 95.5% (n=42) feared a re-occurrence of the acute chest pain episode
- 11.4% (n=5) were taking cardiac medications at the time of the acute chest pain episode;
- 11.4% (n=5) used diabetic agents

- 4.5% (n=2) used aspirin, TB drugs, anti-inflammatory agents and antibiotics respectively.

Participation in decision-making: self participation

Participation in decision-making is the extent to which the patient and his/her family engage in decision-making during an acute chest pain episode.

Although 56.8% (n=25) of the respondents called for help themselves, 38.6% (n=17) depended on others to do so, and 4.6% (n=2) were unsure who did so. Most (86.4%; n=38) respondents had called for help within one hour of the onset of chest pain.

Complexity – psychological functioning and coping

Complexity refers to the intricate entanglement of two or more systems such as the patient's own level of psychological functioning, his/her ability to communicate with others during an emergency situation, and the interactions with family members during the acute chest pain episode.

The respondents rated their own abilities to communicate with others as excellent (61.4%; n=27), good (22.7%; n=10), fair (13%; n=6) or poor (2.3%; n=1). Thus most (84.1%; n=37) respondents would be able to communicate adequately during a crisis situation. However, when asked to rate their own coping capabilities during crisis situations, only 9.1% (n=4) regarded themselves to be excellent, 40.9% (n=15) good, 20.5% (n=9) fair and 6.8% (n=3) poor. These findings imply that while 84.1% (n=37) of the respondents regarded themselves to be capable of good communication, only 47.7% (n=21) would be capable of handling the stress of an acute chest pain episode. Only 13.6% (n=6) of the respondents reportedly did not experience fear during their acute chest pain episode while 86.4% (n=35) reported it to be a frightening experience. Almost all (95.5%; n=42) respondents were anxious about future acute chest pain episodes. Psychological distress can arise from the fear of recurring cardiac problems (Dracup & Moser, 2000:271), which could increase the likelihood of such future episodes. As many as 72.7% (n=32) of the respondents were satisfied with the support they had received from their family members/friends during their acute chest pain episodes.

Participation in care during acute chest pain episodes

The patient and his/her family members should engage actively in all aspects of care, summoning help, implementing telephone instructions, arranging for transportation and assisting the patient. The presence of family members during such episodes could enhance patient outcomes.

The 14 (31.8%) respondents who rested and waited for the pain to subside increased their vulnerability by this delay. The most common action (63.6%; n=28) was to inform a relative/friend about the acute chest pain.

Reportedly 75.0% (n=33) of the patients' caretakers called ambulances and 43.2% (n=19) phoned for medical advice. Out of the 44 respondents, 32 (72.7%) reported that there was full participation by their family members/caretakers in making decisions during the acute chest pain episode.

Resiliency

The ability to use coping/compensatory mechanisms after any insult (such as an acute chest pain episode) is known as resilience. Six aspects of resiliency were addressed during this study, namely the ability to bear chest pain, the ability to understand and execute the telephone instructions while waiting for the ambulance, level of satisfaction with the nurse's telephone inputs, reasons for dissatisfaction with the nurse's instructions, level of knowledge in response to the emergency situation and the methods used to control the patient's acute chest pain.

Reportedly 50% (n=22) of the respondents could bear the chest pain; 50% (n=22) reported that the nurses told them telephonically what to do; 45.9% (n=20) were satisfied with the nurses' telephone assistance while 36.3% (n=16) could not remember whether or not they were satisfied and 18.2% (n=8) were dissatisfied. The patients' reasons for dissatisfaction concerned nurses' unclear instructions, failure to tell the patient exactly what to do and because the ambulance was delayed.

Predictability

A person's ability to determine a course of events is known as predictability, involving the outcome of the acute chest pain episode and the change(s) experienced in the patient's life. Respondents reported survival without complications (77.3%; n=34); admission to hospital (59.1%; n=26) and referral to a cardiologist (59.1%; n=26). The respondents' behaviours changed because 75.0% (n=33) claimed to have gained improved understanding of their cardiac conditions; 84.1% (n=37) increased their knowledge about managing an acute chest pain episode and 81.8% (n=36) realised that they had to make some unspecified lifestyle changes.

Stability

Stability refers to the patient's perceived level of responsiveness to therapy, encompassing the response to pain medication, considering the possibility of death and the perceived risk of developing complications as a result of the acute chest pain episode. Although 22 (50.0%) respondents took unspecified pain medication, only 11 (50.0%) out of these 22 experienced decreased pain levels after taking the medication. Approximately half (52.3%; n=23) of the respondents feared death as a possible outcome of the acute chest pain episode. Reportedly 11 (25.0%) had expected chest pain but 33 (75.0%) did not expect to encounter such an experience.

LIMITATIONS OF THE STUDY

The research results should be interpreted by considering the limitations of this study, including that:

- only 44 persons participated in this study, limiting generalisations from a small sample
- all the respondents had contacted MRIB Ltd; patients who contacted other emergency services might have had similar and/or different experiences
- the study focused only on patients' characteristics in terms of the Synergy Model
- only structured interviews were conducted with 44 patients who had experienced acute chest pain episodes; individual in-depth qualitative interviews might have yielded richer data
- structured interviews were conducted anonymously, making it impossible to control patients' reports with their records
- structured interviews were not conducted with the relatives of the 11 patients who had died prior to their arrival at hospitals/clinics; the experiences of these patients might have differed from those of the survivors.

CONCLUSIONS

The demographic aspects of the patients who had experienced acute chest pain episodes included that there were more women than men who had such experiences, the mean age was 46.6 years and most patients were employed in sedentary positions.

Table 1: Conclusions: characteristics of patients who survived acute chest pain episodes in Botswana

Patient characteristic	Research results
Resource availability	Lacked knowledge about the urgency of acute chest pain and about typical and atypical ACS symptoms; delayed seeking treatment; all accessed health facilities; most used ambulances
Resiliency	Pain medications only worked in 50.0% of patients
Vulnerability	Some had been treated for hypertension, pre-existing cardiac conditions and/or diabetes; many had sedentary jobs, were physically inactive and/or obese
Complexity	Delays in seeking medical treatment and in using cardiac medications could compromise the patient outcomes

Stability	Many feared death, increasing their stress levels and influencing potential patient outcomes negatively
Predictability	Patients' outcomes were good, but necessitated some changes in their lifestyles
Participation in care	Most patients participated in their own care but needed some assistance.
Participation in decision-making	Most patients participated in making decisions about their care but some required advice on making suitable decisions.

RECOMMENDATIONS

Nurses and all professional health care workers, as well voluntary organisations (such as first aid organisations), and employers should provide education about the prevention but also about the early diagnosis and treatment of acute chest pain episodes.

The people of Botswana need to be educated about:

- the signs, symptoms and potential hazardous nature of acute chest pain episodes
- using TNT or aspirin as soon as an acute chest pain commences
- the location of their nearest health care facility
- the emergency medical service's number (should be in their diaries and on their cell phones)
- never ignoring acute chest pain, but getting medical attention as soon as possible
- using an ambulance for transport to the nearest hospital/clinic whenever possible so that emergency care can be instituted as early as possible
- specific lifestyle changes to reduce the risk of future acute chest pain episodes (avoid/address smoking, overweight, alcohol intake, inactivity and manage hypertension, cardiac conditions and diabetes according to doctors' prescriptions)
- specific lifestyle changes subsequent to an acute chest pain episode to avoid further episodes (correctly using prescribed hypertensive, cardiac, diabetic and any other chronic medication; maintaining a suitable diet and weight; stop smoking and avoid/minimise alcohol intake; manage stress at home and at work; obtain psychological assistance to address fears of future attacks and to manage stress; take TNT or aspirin at the commencement of any chest pain; regularly consult the medical practitioner)

Future research should address:

- nurses' experiences of providing telephone advice during acute chest pain episodes

- the correlation between patients' self reports about their acute chest pain episodes and the records kept at the emergency calling centre
- qualitative experiences by conducting in-depth individual and/or focus group discussions with patients who had experienced acute chest pain episodes
- the experiences of the relatives of patients with acute chest pain who died prior to arrival at hospitals/clinics
- possible correlations between pre-hospital emergency care and patient outcomes as reflected in the hospital's and in the emergency service's records
- comparative studies of the outcomes of patients who managed to take TNT or aspirin at the onset of the acute chest pain with those of patients who did not take either of these medications prior to the arrival at hospital

In Botswana it is necessary to raise persons' awareness of the increasing incidence of acute chest pain episodes, and about the actions that can enhance patient outcomes. Awareness and appropriate actions could help to save many Botswana people's lives during their economically productive years – to the benefit of individual persons, families, communities and the country.

LIST OF REFERENCES

AACN see American Association of Critical Care Nurses

AHA – see American Heart Association

American Heart Association. 2008. Heart disease and stroke statistics update. *Circulation*, 117:e25-e146. Available from <http://circ.ahajournals.org> Accessed on 01/09/2008.

American Association of Critical Care Nurses Certification Corporation. 2004. The Synergy Model of certified practice. Available from <http://www.certcorp.org>. Accessed on 17/03/2004.

Brieger, D., Eagle, K.A., Goodman, S.G., Steg, P.G., Budaj, A., White, K. & Montalescot, G. 2004. ACS without chest pain, an underdiagnosed and undertreated high-risk group: insights from the global registry of acute coronary events. *Chest*, 126:461-469.

Burns, N. & Grove, S.K. 1997. The practice of nursing research: conduct, critique and utilization. Philadelphia: WB Saunders.

Dracup, K. & Moser, D.K. 1993. Needs of recovering cardiac patients and their spouses: Compared views. *International Journal of Nursing Studies*, 30:105-114.

Fenton, D.E. & Baumann, B.M. 2005. Acute Coronary Syndrome. E-medicine Available from <http://www.emedicine>. Accessed 01/09/2005.

Finn, J.C., Bett, J.H.N., Shilton, T.R., Cunningham, C. & Thompson, P.L. 2007. Patient delay in responding to symptoms of possible heart attack: can we reduce time to care? *Medical Journal of Australia*, 187(5):293-298.

Hardin, S. & Hussey, L. 2003. AACN Synergy model for patient care: case study of a CHF patient. *Critical Care Nurse*, 23(1):73-76

- Hornby, A.S. 1994. Oxford advanced learner's dictionary of current English. Oxford: Oxford University Press.
- Kucia, A.M., Taylor, K.T. & Horowitz, J.D. 2001. Can a nurse trained in coronary care expedite emergency department management of patients with Acute Coronary Syndrome? *Heart & Lung*, 30(3):186-190.
- Maganu, E. 1996. Access to health facilities in Botswana and its impact on quality of life. Paper presented at Ministry of Health Symposium on the quality of life in Botswana, October 15-18, 1996. Gaborone: Ministry of Health.
- Medical Rescue International Botswana Limited. 2004-05 Client Register. Gaborone.
- MRIB Ltd see Medical Rescue International Botswana Limited
- Polit, D.F. & Hungler, B.P. 1999. Nursing research: principles and methods. Philadelphia: JB Lippincott.
- Rubio, F. & Jato, M. 2004. Ischemic stroke: a treatable emergency and a preventable catastrophe. *Cerebrospinal Disease*, 17(1):70-73.
- Ryan, C.J., Dvon, H.A. & Servic, J.J. 2005. Typical and atypical symptoms: diagnosing acute coronary syndrome accurately. *American Journal of Nursing*, 105(2): 34-36.
- Shellack, G. 2004. Pharmacology in clinical nursing practice: application made easy. Cape Town: Juta.
- Steptoe, A. & Marmot, M. 2003. Burden of psychosocial adversity and vulnerability in middle age: association with biobehavioral risk factors and quality of life. *Psychosomatic Medicine*, 65:1029-1037.
- Smeltzer, S.C., Bare, B.G., Hinkle, J.L. & Cheever, H.K. 2008. Brunner & Suddarth's textbook of medical-surgical nursing. 11th Edition. Philadelphia: Lippincott, Williams & Wilkins.
- Strike, P.C., Perkins-Porras, L., Whitehead, D.L., McEwan, J.R. & Steptoe, A. 2006. Triggering of acute coronary syndrome by physical exertion and anger: clinical and sociodemographic characteristics. Heartonline: 200507636. Available from <http://heart.bmjournals.com>. Accessed 08/02/2006.