Self-management of coronary heart disease in older patients after elective percutaneous transluminal coronary angioplasty

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Abstract

    Objective   To explore how older patients self-manage their coronary heart disease (CHD) after undergoing elective percutaneous transluminal coronary angioplasty (PTCA). **Methods**   This mixed methods study used a sequential, explanatory design and recruited a convenience sample of patients ($n = 93$) approximately three months after elective PTCA. The study was conducted in two phases. Quantitative data collected in Phase 1 by means of a self-administered survey were subject to univariate and bivariate analysis. Phase 1 findings informed the purposive sampling for Phase 2 where ten participants were selected from the original sample for an in-depth interview. Qualitative data were analysed using thematic analysis. This paper will primarily report the findings from a sub-group of older participants ($n = 47$) classified as 65 years of age or older. **Results**   78.7% ($n = 37$) of participants indicated that they would manage recurring angina symptoms by taking glyceryl trinitrate and 34% ($n = 16$) thought that resting would help. Regardless of the duration or severity of the symptoms 40.5% ($n = 19$) would call their general practitioner or an emergency ambulance for assistance during any recurrence of angina symptoms. Older participants weighed less ($P = 0.02$) and smoked less ($P = 0.01$) than their younger counterparts in the study. Age did not seem to affect PTCA patients' likelihood of altering dietary factors such as fruit, vegetable and saturated fat consumption ($P = 0.237$). **Conclusions**   The findings suggest that older people in the study were less likely to know how to correctly manage any recurring angina symptoms than their younger counterparts but they had fewer risk factors for CHD. Age was not a factor that influenced participants' likelihood to alter lifestyle factors.

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1   Introduction

Coronary heart disease (CHD) is considered to be a true pandemic, killing in the region of eight million people globally each year.[1] It is known to be the main cause of death in the Western world and is increasing in developing countries.[2,3] It is estimated that 85% who die as a consequence of coronary heart disease are those aged 65 or older.[4] Although mortality rates are declining overall, the prevalence of the disease in the United Kingdom remains high and the commonest manifestation of coronary heart disease is stable angina. In the United Kingdom, there are more than four million people who suffer from angina and that equates to 5% of males and around 4% of females.[5] In the USA more than a fifth of people aged eighty and older suffer from stable angina.[6] The prevalence of stable angina increases with age.[7]

In an attempt to control angina symptoms, patients can undergo two main types of elective coronary revascularisation: percutaneous transluminal coronary angioplasty (PTCA) and coronary artery bypass graft (CABG) surgery.[8] While there has been a gradual decline in the use of CABG surgery in the last decade in the United Kingdom, the number of PTCA procedures has grown substantially from around 10,000 in 1990 to almost 90,000 in 2010.[9] While PTCA should diminish patients' angina symptoms, it does not cure the underlying CHD and patients are expected to manage their condition and prevent progression of the disease

through adherence to a medication regime and by reducing modifiable risk factors known to contribute to CHD.[10] They would also be expected to identify and deal with any recurring angina symptoms.[11] It is known, however, that three quarters of PTCA patients will require further revascularisation within ten years for further symptom management.[12,13]

Anecdotal evidence from clinical practice in the United Kingdom suggested that patients with stable angina may not manage their CHD effectively after they have PTCA for symptom relief. Evidence indicates that between 31% and 75% of patients regularly experience angina symptoms after PTCA,[14–17] and that a diverse range of methods are adopted to manage these symptoms including taking no action at all and contacting healthcare professionals for support. One study found that older patients were less likely to experience angina symptoms after elective PTCA,[15] but due to limitations of the study design, the reason for that was not evident. It is unknown whether patients adhere to clinical guidelines, for example when experiencing angina symptoms they should rest and use their glyceryl trinitrate spray and then if the symptoms continue for 10–15 min, make a call to emergency services.[18]

The rate of CHD risk factor modification after elective PTCA is poor and patients' risk of CHD progression remains high as a result of inactivity and obesity.[19,20–22] One study[19] indicated that patients made no changes to smoking or body mass index (BMI) after PTCA, whereas another made unsubstantiated claims that patients found it easier to make dietary alterations than change other modifiable risk factors.[23] Smoking continued to pose a risk to some patients after PCTA in two studies,[19,22] and some evidence indicates that the incidence of CHD patients who smoke is higher in Asia than Europe.[24]

There is a paucity of evidence about patients' adherence to a medication regime as a strategy for secondary prevention of CHD post-PTCA. The focus of many studies is the rate of prescribing of certain medicines. Two studies that did explore adherence to medication found that almost all patients self-reported adherence to their medication after elective PTCA.[14,25] These studies were however, limited by their design (non-experimental, cross-sectional study design) and sampling approach (both studies used a convenience sample). One study used a heterogeneous sample of patients who had undergone PTCA for both the management of stable angina symptoms and myocardial infarction and so did not comprehensively provide evidence of patients' adherence to medicines specifically after elective coronary revascularisation with PTCA.

To date, there is little evidence of patients' adherence to

secondary prevention of CHD medications and to clinical guidelines in relation to the self-management of angina symptoms after PCTA. Previous research suggests that CHD risk factor modification after elective PTCA may be poor but that some risk factors may be easier to change than others and so there appears to be a knowledge gap. The purpose of this paper is to report the findings of a study that sought to explore this with a focus on older patients (those aged 65 years and older) who underwent PTCA for the relief of stable angina symptoms.

We forward the proposition that: older patients after undergoing elective PTCA for the management of stable angina symptoms have ineffective management of angina symptoms, they modify few CHD risk factors but they do adhere to a medication regime for secondary prevention of CHD. Thus the hypotheses are tested: H_{o1}, patients effectively self-manage angina symptoms V; H_{a1}: patients do not effectively self-manage angina symptoms; H_{o2}: there is little or no modification of CHD risk factors V; H_{a2}: at least one CHD risk factor is modified; H_{o3}: patients adhere to a medication regime for the secondary prevention of CHD risk factors V; and H_{a3}: patients do not adhere to a medication regime for the secondary prevention of CHD.

2 Methods

2.1 Study design and location

A sequential, explanatory mixed methods design was used for this study.[26] The study took place in a teaching hospital in central Scotland, United Kingdom. The hospital where the patients were recruited was chosen as it has one of the highest procedure rates for PTCA in the United Kingdom.[27,28]

2.2 Ethical approval

Ethical approval to undertake the research was given by the regional Research Ethics Committee and permission to conduct the study was also given by the Research and Development Department at the teaching hospital where the study participants were recruited.

2.3 Study population

A convenience sample (n = 93) of patients who had undergone elective PTCA for the management of stable angina pectoris was recruited. Those eligible to participate were patients who had elective coronary revascularisation with PTCA under the care of consultant cardiologists at the teaching hospital in Scotland. Participants also needed to be able to speak and read English. Any patients who had suffered a serious complication during PTCA (e.g., stroke,

coronary artery dissection) were excluded from the study, as were those who were unable to provide consent to participate, including those with impaired cognition. A power calculation performed to estimate the sample size of the study concluded that a minimum of 81 participants were required for phase 1 of the study.

2.4   Study protocol

The study was divided into two phases; the first collected data from participants by means of a self-administered survey and phase two used face-to-face interviews to gather qualitative data from study participants. Data were collected between December 2011 and January 2013.

Potential participants were identified by the cardiology healthcare team and were given a pack of information about the study on the day they had their PTCA procedure performed. Eligible participants were invited to take part in the study when they attended their first outpatient consultation with their cardiologist approximately three months after the PTCA. After giving their written consent to take part, a self-administered survey was administered to participants. The survey contained items related to patient demographics including age, level of education, marital status and gender. It also used outcome measures related to patients' self-management of CHD and gathered data on anxiety, depression and illness perceptions using the validated Hospital Anxiety and Depression Scale (HADS) and the Brief Illness Perceptions Questionnaire (Brief IPQ).[29,30] The survey tool was checked for face validity by a group of healthcare practitioners who are considered "expert" in the cardiology specialty and it was also piloted with a small group ($n = 8$) of PTCA patients.

The survey data collected in Phase 1 were analyzed using univariate (descriptive statistics: measures of central tendency, distribution and spread) and bivariate (independent samples t tests) procedures using the software package SPSS Version 20.

Purposive sampling for phase 2 of the study was informed by the findings from phase 1 and ten participants were selected from the original sample for an in-depth face-to-face interview. To ensure a wide representation of participants with differing abilities in self-management of CHD, criteria were developed to inform the purposive sampling process for phase 2. Participants were selected from the original sample based on their demographics, their knowledge of how to manage angina symptoms, their lifestyle factors and whether any changes had been made to these and their self-reported adherence to medicines.

A hybrid approach to qualitative data analysis was used and that aligned with the explanatory design of the study.[26]

The quantitative findings from phase 1 informed the development of some pre-determined, A priori topic codes and these were used in deductive analysis of the qualitative data.[31,32] An inductive approach was also used to analyze the qualitative data to ensure the findings were not 'stifled' through confinement to the A priori codes only. Coding was performed by two independent researchers and comparisons made to ensure rigor and consistency. Through the iterative approach used to analyze the qualitative data, themes developed from the findings and these were subsequently grouped into over-arching themes. Member validation was used to check the reliability of the themes.

3   Results

3.1   Sample demographics

Within the convenience sample of ninety-three patients in Phase 1, forty-seven participants were aged 65 years or older (identified as the older age group in this study) and just over a quarter of this sub-group (27.7%) were female. The ethnic group that predominated was white but the representation of people with an Asian ethnicity was consistent with previous epidemiological studies that showed that particular group of people to have a higher incidence of CHD.[33] The majority of the older participants in the study owned their own homes (81.8%). Just under a quarter of them lived alone (23.4%) and the same percentage lived in the most deprived areas in central Scotland when the Scottish Government's tool for measuring deprivation, the Scottish Index of Multiple Deprivation was applied.[34] A total of 36.2% of the sub-group of older participants were educated beyond secondary school.

More than three quarters of the sub-group (78.7%) had at least one existing co-morbidity and just under half (46.8%) had three or more, the most common were osteoarthritis, type 2 diabetes and hypertension (Table 1).

3.2   Relationship between age and self-management of angina symptoms

Since the PTCA procedure, approximately 40% of the older participants had experience what they considered to be angina symptoms and a slightly greater proportion (43.5%) reported that these symptoms had a limiting effect on their daily activity. When asked how these symptoms would be managed, the most common response (78.7%) from these participants was that they would take glyceryl trinitrate (Table 2). Around a third of the older age group also thought that they should rest or relax. Regardless of the duration or severity, over a quarter (27.7%) of the participants would

Table 1. Participants' age related to co-morbidities.

Condition	Age	
	< 65 yrs	≥ 65 yrs
Angina	77.5%	72.3%
Previous myocardial infarction	35.0%	40.4%
Hypertension	57.5%	48.9%
Arthritis	22.5%	25.5%
Anxiety	25.0%	8.5%
CABG	7.5%	21.3%
Type 2 diabetes	15.0%	21.3%
Type 1 diabetes	15.0%	6.4%
Asthma	12.5%	4.3%
Chronic lung disease	5.0%	6.4%
Kidney disease	2.5%	6.4%
Depression	22.5%	6.4%
Other	36.4%	17.0%
Co-morbidities	70.5%	78.7%
At least 3 co-mobidities	56.8%	46.8%
Activities limited by health problem	55.0%	55.3%
Angina limited activities	89.5%	77.3%
Angina since PCI	59.0%	39.1%
Angina since PCI limited activities	56.4%	43.5%

CABG: coronary artery bypass graft; PCI: percutaneous coronary intervention.

Table 2. Participants' age related to angina management.

Responses to angina	Age	
	< 65 yrs	≥ 65 yrs
Won't get angina now	-	-
Ignore it	0	0
Rest/Relax	45.0%	34.0%
Call 999	25.0%	12.8%
Take GTN	77.5%	78.7%
Call/Contact friends or family	15.0%	4.3%
Worry about it	7.5%	4.3%
Call general practitioner	20.0%	27.7%

GTN: glyceryl trinitrate.

call their general practitioner for any recurrence of angina symptoms, and a further 12.8% would contact the emergency ambulance/paramedic service for assistance.

Older people in the study were less likely to know how to correctly manage any recurring angina symptoms (rest and administer glyceryl trinitrate) than their younger counterparts. This is evidenced in that 34% of older PTCA patients would rest when the angina symptoms occurred compared with 45% of the younger patient group. Also a greater number of older patients (27.7%) would inappropriately contact their family doctor for any symptom recurrence compared with 20% of those under the age of 65 years.

Older participants in the study indicated that there were

unlikely to contact healthcare services out-with normal working hours as patients perceived that they would be too busy to attend to them. A quote from one participant highlights this: "*At night I wouldn't call an ambulance, I would wait until the GP (general practitioner) opened at half past eight*" (Participant No. 86; 77 years old).

Older participants also believed that by seeking help from their general practitioner initially that medical attention in hospital would be expedited. "*I think by doing it through the surgery (general practitioner), the hospital knew I was coming and I didn't have to sit and wait for a long time*" (Participant No.14; 82 years old).

This seemed to result in lengthy delays in seeking treatment for ongoing angina symptoms. Older participants in the study who had co-morbidities were more likely than the younger participants to trivialize their angina symptoms and believed that they would resolve with little or no personal intervention. "*If I suddenly got it (pain), I would just wait until it goes away. I don't think I really need GTN...My aortic valve stenosis is worse. I get really breathless.* (Participant no. 93, 82 years old).

Relationship between age and self-management of CHD risk factors: A small proportion (4.7%) of older participants smoked cigarettes regularly, over 80% took some exercise on most days of the week and just under half (47.8%) abstained from drinking alcohol. Almost two thirds of the older participants ate between 3 and 5 portions of fruit and vegetables per week. Since the PTCA a number of the older participants had made alterations to their CHD risk factors. More than half ate less saturated fat but more fruit and vegetables, two participants in five indicated that they had increased the amount of exercise they participated in each week and a third of the sub-group reported that they had reduced their weight since the PTCA.

An independent samples *t*-test was used to establish any association between participants' age and their ability to adopt a healthy lifestyle. The test results suggest that older participants tended to weigh less and were less likely to smoke than their younger counterparts in the study. These findings were statistically significant at the 5% level ($P = 0.02$ and 0.01 respectively). The effect that age had on the changes participants made to fruit/vegetable consumption, fat consumption and weight, was tested using an independent samples *t*-tests. Age did not seem to affect PTCA patients' likelihood of altering these dietary factors in the adoption of a healthy lifestyle. There was no statistically significant difference noted between the age of participants who made no dietary changes compared with those who did (66.96 *vs*. 67.75 years, $P = 0.237$).

Some older participants seemed very motivated to mod-

ify their lifestyle to reduce their risk of CHD progression and a quote from one participant illustrates this: "*I had a look on the [inter]net and just cut anything that was to do with vegetable fat or saturated fat right out to make my diet healthier.*" (Participant No. 91, 66 years old).

It was also found that older participants with co-morbidities thought that their co-morbid conditions were more serious than CHD and that appeared to lessen their motivation to change their behavior to reduce their CHD risk. "*Well I think the bigger change in the diet was at the time of the diabetes.* (Participant No. 70, 85 years old).

3.3 Relationship between age and confidence in self-management of CHD

It is known that confidence or self-efficacy may influence the effectiveness of patients' CHD self-management.[35,36] Using a five point scale (1 = totally confident to 5 = not at all confident, Table 3), participants in the study were asked how confident they were on various aspects such as when to seek medical help, how much exercise to take and general confidence in self-managing CHD. It was found that although a larger proportion of the older participants indicated that they were either very confident or confident in doing this, using an independent t test there was found to be a significant statistical difference between the two age groups ($P = 0.007$).

Evidence also indicates that perceptions of illness can affect CHD patients' symptom management.[15,17] Respondents were asked about their perceptions of CHD on an eleven point scale from 0 (not at all) to 10 (fully) where the higher end of the scale represents more threatening illness perceptions. The under 65 year olds had a mean score of 7.82 and those aged 65 or more had a slightly higher mean

Table 3. Participants' age related to confidence*.

Confidence	Age		P value
	< 65 yrs	≥ 65 yrs	
How confident about knowing when to seek medical help	2.43	2.02	0.038
How confident about maintaining usual activities at home	2.54	2.31	0.375
How confident about maintaining social activities	2.6	2.48	0.653
How confident in knowing how much exercise to take	2.83	2.23	0.031
Confidence in self-management	2.97	2.37	0.007
Confidence in knowing how to take medicines	1.43	1.5	0.686
Overall confidence	3.89	4.21	0.245

Data are presented as mean values. *Confidence on a 5 point scale 1 = totally confident to 5 not at all confident.

score of 8.36, the difference however, using an independent *t* test the difference was not found to be statistically significant ($P = 0.295$).

4 Discussion

The quantitative findings indicate that a statistically significant link existed between older age and less effective monitoring and management of angina symptoms in the sample. Qualitative data from phase 2 of the study suggested a possible explanation for this could be that older participants were more stoic and accepted recurring pain as a sign of the normal aging process. While under reporting of pain has been linked to stoicism before, the research concerned elderly patients with osteoarthritis.[37,38] Any delay in accessing treatment could however, cause a significant risk to CHD patients' morbidity and mortality.

Older participants in the study also seemed to have a greater reliance on their general practitioner to help them deal with any angina symptoms. There was a general reluctance by more elderly PTCA patients to contact unscheduled care services when angina symptoms were prolonged. Research has found that older members of the public are less likely to contact emergency ambulance services and other unscheduled care services.[39] Evidence emerged to suggest that stoicism in older participants meant that they endured the angina symptoms and waited until they could get help from their general practitioners, rather than calling for emergency ambulances. This study provides evidence that older PTCA patients think that recurring angina symptoms are normal in the aging process and are reluctant to contact emergency services for prolonged periods of pain, opting to see their general practitioners instead.

It seemed that older participants who had co-morbid conditions trivialized their angina symptoms and believed that they would resolve with little or no personal intervention. The trivialization of angina symptoms in these participants may be a consequence of them experiencing few angina symptoms after PTCA. This contrasts with other cardiac patients (e.g., heart failure patients) as they are more likely to have frequent symptoms and so more effort is required from the patient to manage these.[40,41] Ineffective symptom management could have an impact on the morbidity and mortality of PTCA patients.

It is documented that 80% of CHD is preventable,[42] and it is recommended that patients adopt and maintain healthier lifestyles to reduce their risk of disease progression.[43,44] In the current study, it was found that participants older than 65 years had fewer CHD risk factors and that many were motivated to adopt more healthy behaviours soon after the

PTCA. Those with co-morbidities however, often perceived the co-morbid condition to be more serious and that appeared to make them less likely to modify lifestyle factors.

Older participants in the study reported greater confidence in self-managing their CHD and had more threatening perceptions of their condition than the younger patients in the study but this did not achieve statistical significance.

4.1 Limitations

The non-probability approach to sampling limits the ability to generalise the findings of the study to the wider PTCA population. Also, the use of a single research centre in Scotland cannot guarantee the representativeness of the sample in relation to the global PTCA patient population. It does however, provide a valid perspective of how patients cope with their CHD self-management after PTCA.

Although the sample size for this study was sufficient based on the power calculation used to determine it, the number of patients aged 65 years or older was relatively small ($n = 47$, 50.5% of total sample). This limited the depth and scope of the analysis and indicates the need for larger sample sizes in future studies.

No survey tool existed that encompassed all aspects of CHD self-management and so a new tool was developed. While some items were included that were already known to be reliable and valid (HADS, Brief IPQ), new questions in the survey were tested for face/content validity by experienced researchers and cardiology practitioners. Further testing would have enhanced the reliability and validity of this survey tool. Performing a pilot project, however, helped to provide reassurance that the questionnaire functioned well.

There was a potential for response bias as the participants' responses were self-reported and so need to be taken at face value, as no objective corroboration was used. Using a mixed methods study design, however, helped to reduce the possible biases of one single method.[45]

4.2 Conclusions

Globally, it is known that populations are aging,[46,47] and the growth rate is staggering, particularly in those aged eighty years and older who are considered the 'oldest old'. For example, in China, it is predicted that the 'oldest old' population will swell almost five fold from around eighteen million people in 2010 to an estimated ninety-eight million by 2050.[48] Consequently, the incidence of CHD will increase,[7] and the demands on healthcare will escalate. Traditional care for older patients with CHD is likely to be eroded,[49] and replaced with a greater reliance on people to self-manage their condition. This Scottish study however, indicates that CHD self-management in patients over the age of sixty-five years who have undergone elective PTCA for the management of stable angina symptoms is sub-optimal.

Few studies have explored CHD self-management specifically in a PTCA patient population. This study provides evidence that older patients are less likely to know how to correctly manage any recurring angina symptoms than their younger counterparts after coronary revascularization with PTCA. Many older patients would suffer ongoing angina symptoms rather than access healthcare services out-with normal working hours and consider angina symptoms to be part of a normal aging process. Any delays in accessing help for prolonged angina symptoms could increase patients' risk of morbidity and mortality. Other patients would contact their general practitioner for any recurrence of angina symptoms and that increases the demand for healthcare provider support for CHD self-management.[50]

Current methods of educating and supporting patients after elective PTCA in their management of angina symptoms seem inadequate and healthcare professionals need to determine the most effective way to enhance these to reduce the patients' mortality and morbidity risk and also their reliance on help from general practitioners for any episode of symptoms.

Although older participants in the study had fewer CHD risk factors than those under the age of sixty-five years, the existence of co-morbidities made it less likely for them to modify their lifestyle. As the world population ages and a greater number of older people present with CHD, the healthcare cost associated with not supporting lifestyle change in patients who are known to be less likely to make changes may become unsustainable.[51] This study therefore, gives evidence that older patients with co-morbidities after elective PTCA require support and potential intervention to lessen their risk of CHD progression.

It seems that this is the first study of its kind to find that patients after elective PTCA for the management of stable angina have sub-optimal angina management and those with co-morbidities are less likely to alter lifestyle factors to lessen the risk of CHD. As the global population ages, a review of how these patients are supported in their self-management of CHD seems necessary.

Acknowledgements

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