

**Cardiologists' and patients' views about the informed consent process and
their understanding of the anticipated treatment benefits of coronary
angioplasty: a survey study**

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Abstract

Background: Percutaneous Coronary Intervention (PCI) is a common revascularisation technique. Serious complications are uncommon, but death is one of them. Seeking informed consent in advance of PCI is mandatory. Research shows that PCI patients have inaccurate perceptions of risks, benefits, and alternative treatments. **Aim:** To assess cardiologists' and patients' views about the informed consent process and anticipated treatment benefits. **Methods:** Two cross-sectional, anonymous surveys were distributed in England. An electronic version to a sample of cardiologists, and a paper based version to patients recruited from 10 centres. **Results:** A sample of 118 cardiologists and 326 patients completed the surveys. Cardiologists and patients shared similar views on the purpose of informed consent; however, over 40% of patients and over a third of cardiologists agreed with statements that patients do not understand, or remember, the information given to them. Patients placed less value than cardiologists upon the consent process and over 60% agreed that patients depended on their doctor to make the decision for them. Patients' and cardiologists views on the benefits of PCI were significantly different; notably, 60% of patients mistakenly believed PCI was curative. **Conclusions:** The PCI informed consent process requires improvement to ensure that patients are more involved and accurately understand treatment benefits to make an informed decision. Redesign of the patient pathway is recommended to allow protected time for health professionals to engage in discussions using evidence based approaches such as 'teach back' and decision support which improve patient comprehension.

Introduction

Since its inception in the 1970's Percutaneous Coronary Intervention (PCI), also known as coronary angioplasty with stenting, has evolved to become the most common invasive cardiovascular intervention performed in high and middle-income countries across the world.¹ PCI, is the preferred treatment for people diagnosed with acute coronary syndrome, as it is associated with improved survival rates and a reduced incidence of death or non-fatal myocardial infarction (MI) when compared to medical therapy alone.² However there is limited clinical evidence to suggest that PCI confers any survival benefit for those with stable coronary heart disease (CHD).³⁻⁵ Therefore PCI is recommended in patients whose symptoms persist after the optimisation of medical therapy.⁶ Despite this guidance there has been an overuse of PCI in some countries. In America 10-12% of elective PCI procedures have been classified as being 'inappropriate', when matched with eligibility criteria listed in clinical guidelines, and a further 38% classified as having 'uncertain' appropriateness.⁷⁻⁸ Inappropriate PCI should be avoided as it can lead to avoidable patient harm as no medical procedure is free of risk. Health systems are mandated to make improvements to ensure that health care is safe and person centred;⁹ a high quality consent process exemplifies these characteristics.

The combination of 'inappropriate' PCI's with the policy imperative for shared decision-making between patients and doctors has led to a renewed focus upon the consent process. As part of seeking consent for non-emergency PCI treatment, a patient and their cardiologist, will participate in a supported decision-making process which concludes with the signing of a consent document giving permission for treatment.

The informed consent process has the principle of patient autonomy at its foundation which means that individuals have the right to make decisions about what happens to them. Consent is required before any invasive medical or surgical procedure and for it to be valid, the patient must have the capacity to make a decision, be appropriately informed and act voluntarily.¹⁰ A key part of the PCI consent process involves a discussion in which the doctor discloses key information about what the procedure entails, the potential risks and benefits, alternative treatments and what would happen if they decided to have no treatment.¹⁰ The aim of such discussions is to make the patients aware that they have a choice to make about their treatment and options to consider within a supported decision making process. However the PCI informed consent process is complex because it is more than a simple information transfer. Rather, it is an interaction between two individuals, each with their own unique attitudes, values, preferences and expectations which influence what is said and how it is communicated.¹¹

International research reports that the amount and quality of the information given to patients undergoing PCI is variable; benefits are often overestimated, risks forgotten and alternative treatments not always considered.¹¹⁻¹⁷ Effective risk communication is important as although elective and acute PCI are relatively low risk procedures death is a complication in <1% of cases.¹⁸ Surprisingly patients are not always clear about the potential outcomes of PCI and often assume that elective PCI will prolong their lifespan and prevent a future MI; a view not always shared by their cardiologists.¹¹ In summary PCI patients do not appear to be fully informed in the way that is described in clinical guidance.¹⁰ Therefore understanding the PCI informed consent process is an important step in identifying approaches to improve clinical practice which supports the rationale for this study.

There are no survey studies we are aware of reporting patients' and cardiologists' views about the informed consent process for coronary angioplasty in England. Our aim was to address this gap in current research by conducting a survey to assess cardiologists' and patients' views about the informed consent process and their understanding of anticipated treatment benefits.

Methods

Design

Cross-sectional survey design.

Study population and procedure

A self-report questionnaire was distributed to two groups; a sample of 400 patients in England treated with either elective or acute PCI (acute/urgent cases but not primary PCI), and a non-probability sample of 400 UK cardiologists involved in taking PCI informed consent. The patient sample comprised participants recruited from a sample of 10 PCI centres in England, stratified by geographical region and PCI throughput (<400 or >400 PCI procedure per year). To reduce bias and support the generalisability of findings we randomly selected centres from each strata. Research nurses, not directly involved in the study, identified eligible patients. All adults undergoing elective or urgent PCI, who were able to read English, and willing to give their consent to participate were included. Adults treated with primary PCI were excluded due to differences in the IC process.

The cardiologist sample was all 763 medically qualified British Cardiovascular Intervention Society (BCIS) members (64% consultants and 36% non-consultants) from a database held by a UK professional organisation; the total workforce of cardiologists in the UK is estimated to be 1400.¹⁹ Sample sizes were determined based on the primary aims of the study to determine the proportion of patients and cardiologists who identified key principles outlined in UK guidance¹⁰ as important and are comparable with other similar survey studies.¹⁶

Instrument Development

No validated surveys that matched the study aims were identified in a scoping review. Therefore two researcher-generated questionnaires were designed (see Appendix 1), informed by items adapted from an existing survey.¹³ The two surveys were conceptually identical and focused upon participants' views about informed consent (the purpose of informed consent, attitudes towards informed consent, and views about discussing treatment, risk, benefits and perceived outcomes). A 5-point Likert scale was completed, indicating the level of agreement with a total of 22 statements. Demographic data were also collected. The surveys were piloted and the content reviewed by clinicians (15 cardiologists and specialist nurses) and patients (5 patients diagnosed with CHD). Feedback was integrated into the final versions to support the acceptability and content validity of the measure. Lay terminology was used in the patient survey to maximise comprehension and the content was kept brief to minimise user fatigue and optimise response rates. Responses were scored 1 to 5 depending on the strength of agreement an individual have with a statement; a score of 1 corresponding to 'strongly agree' and a score of 5 with strongly disagree. The items on the questionnaire were grouped into five distinct domains, each of which represented a specific outcome. For each group, a combined score for analysis was

created comprising the sum of all item scores in that group. All items were weighted equally within each group.

Ethical considerations

University ethical approval was secured before surveys were distributed, with additional approval from National Health Service Research Ethics Committee for the patient survey. The conduct of the study conformed with the ethical principles outlined in the Declaration of Helsinki.²⁰

Data collection

The anonymous electronic questionnaire was distributed by email to all medically qualified members of the BCIS. Completion was indicative of participants consent. An E-survey was chosen as data is rapidly transmitted, responses are more likely to be candid and this approach matched participants computer literacy level. A paper-based patient survey was chosen to maximise patient participation. The questionnaire was administered by research nurses located at each of the participating National Health Service centres.

Statistical Analysis

Anonymised data from the electronic and paper-based questionnaires were extracted, inspected for invalid entries, obvious errors corrected and the extent of missing data assessed for suitability for imputation before coding of raw scores. A sample of data from the paper-based versions was double entered to support quality assurance. The demographic and health characteristics of the patient and cardiologist cohorts were summarised descriptively and Mann-Whitney U tests conducted to assess the significance (5% significance level) of any differences in responses between patients

and cardiologists, and/or between acute and elective patients. All analysis was conducted using SPSS statistical software (Version 24).

Results

Sample characteristics

Tables 1 and 2 show the demographic data for the final sample of patients (n=326; 82% response rate) and cardiologists (n=118; 16% response rate). The characteristics of the patients sample generally reflect those of the wider population diagnosed with CHD which supports the generalisability of findings. Almost one third of the sample (31%) needed some degree of help to understand health related written information. The majority of elective PCI patients (81%) were sent written information in advance and 99% signed their consent form on the day of their procedure. Forty-seven percent of all patients would have liked a family member with them when their treatment was explained during the informed consent process.

The sample of cardiologists was predominantly male (92%). The average time to complete the consent process was between 6 to 9.5 minutes for low risk and high-risk patients respectively. Less than a quarter (23%) of operating cardiologists always conducted the consent processes for their patients.

Table 1: here please (Summary of patient demographic, health and treatment characteristics)

Elective and acute patients showed similar demographic and health-related characteristics.

Table 2: here please (Summary of cardiologist characteristics)

Questionnaire data

Survey data from patients (acute presentation (A) and elective presentation (E)) and cardiologists is presented separately.

i. What is the purpose of informed consent?

Patients: Almost all participants perceived informed consent to be a process that helped them to understand the benefits (91% A, 92% E), risks and complications (97% A, 97% E) of PCI. The vast majority (89% A, 93% E) agreed that informed consent was part of having the right to choose their treatment. Although numerically fewer, the majority also agreed that the purpose of the informed consent process was to educate them about alternative treatment options (72% A, 73% E).

Cardiologists: Responding cardiologists reported that the main purpose of the PCI consent process was to provide information about benefits (95%), risks and complications (100%). The majority also agreed that the process respected the right to autonomy (89%), and was an opportunity to discuss alternative treatments (71%).

A Mann Whitney U test revealed no evidence at the 5% significance level for a difference between patients' and cardiologists' views of the purpose of informed consent ($p=.050$); mean patient rank =203.9, mean cardiologist rank=229.2).

ii. Your attitude to informed consent

Patients: A majority agreed that most patients depended on their doctor to make the decision for them (66% A, 62%).

Approximately half of respondents agreed that most patients do not usually understand (54% A, 41% E) or remember (67% A, 56%E) the information provided during the informed consent process.

Cardiologists: Only approximately a quarter of cardiologists agreed that patients depended on their doctors to decide what is best for them (27%). A third agreed that most patients do not usually understand all of the information given to them during the IC process (34%), while around half (53%) agreed that most patients do not usually remember this information.

A Mann Whitney U test revealed evidence at the 5% significance level for a difference between patients' (acute and elective combined) and cardiologists' views regarding the necessity and appropriateness of informed consent ($p < .001$; mean patient rank=191.6, mean cardiologist rank=270.1). Cardiologists considered informed consent to be more appropriate and necessary than patients.

iii. Talking about my treatment and possible risks.

Patients: Almost all patients agreed that they should have an explanation provided to them about what the PCI procedure entailed (98% A, 99% E), what the procedure aimed to achieve (98% A, 100% E), what additional procedures might be necessary (95% A, 97%), what other treatment options were available (80% A, 88% E) and what sort of realistic outcome they should expect (91% A, 94% E). (These items were grouped for analysis as being 'positive items'). The vast majority of patients, especially elective PCI patients, wanted to know about the possibility of death (78% A, 90% E), significant disability (84% A, 94% E), less significant disability (89% A, 95% E), alternative treatments (80%% A, 89% E), or what the outcome would be if they refused

treatment (80% A, 87% E). (These items were grouped for analysis as being 'negative items').

Cardiologists: All cardiologists agreed that the aim of PCI treatment be explained with procedural details and details about any risk of significant disability. Almost all cardiologists agreed that information about PCI outcomes should be explained (98%), the likelihood of additional future procedures (97%), the risk of less significant disability (94%), death as an outcome (93%), or the outcome if treatment was refused (90%). Over three quarters of the sample agreed that alternative treatment options should be discussed (77%).

A Mann-Whitney U test showed no evidence at the 5% significance level for a difference between patients' (acute and elective combined) and cardiologists' views about the explanations of treatment and risk; either positive ($p=.317$; mean patient rank=208.4, mean cardiologist rank=221.1); or negative items ($p=.570$; mean patient rank=210.6, mean cardiologist rank=203.4).

iv. Preferences about the characteristics of risk information

Patients: The vast majority of patients, especially elective PCI patients, wanted to know about all possible risks (86% A, 91% E). (For brevity these item was not included in the cardiologist survey). A Mann-Whitney U test showed no evidence at the 5% significance level for a difference in the views of acute and elective patients respectively ($p=.717$; mean elective patient rank=158.6, mean acute patient rank=158.6) about the disclosure of all possible risks linked to PCI.

v. **What should I expect after PCI treatment?**

Patients: Almost all patients expected to have symptomatic relief (99% A, 98% E) with widened coronary arteries (99% A, 97% E). Over half (60% A, 60% E) believed that PCI would 'cure' their CHD. Most believed that PCI would reduce their risk of a future heart attack (89% A, 95% E) and increase their life span (87% A, 91% E).

Cardiologists: The majority of cardiologists agreed that elective PCI would relieve symptoms (98%) and widen coronary arteries (88%). Few agreed that elective PCI was a cure for CHD, or would reduce future risk of AMI (12%) or prolong lifespan (3%).

A Mann Whitney U test revealed evidence at the 5% significance level for a difference between the views of acute and elective patients about treatment expectations ($p < .001$; mean acute patient rank = 275.1). Acute PCI patients had more accurate treatment expectations compared to elective PCI patients.

Discussion

Our study had two aims; to assess cardiologists' and patients' views about the informed consent process and their understanding of anticipated treatment benefits.

To our knowledge this is the first study conducted in England to compare coronary angioplasty patients' and cardiologists' perspectives on the informed consent process. Patients and cardiologists shared remarkably similar views about the purpose of informed consent. Over 89% agreed that being informed, and able to act autonomously were key principles that underpinned the informed consent process. These views align with current guidance.¹⁰ However almost one third of patients and cardiologists disagreed that alternative treatments should be discussed in the informed consent process; a view that does not match current guidance.¹⁰ Knowing

about alternative treatment options is an important part of the patient being fully informed¹⁰ and is central to both person centred care²¹ and shared decision making.²² The lack of emphasis given to discussions about alternative treatments is reported in qualitative research about the patient experience of the informed consent process for both elective and acute coronary angioplasty procedures;¹¹ findings showed that participants were typically unaware of alternative treatment options including the option of having no treatment.¹¹ This general lack of awareness amongst patients about alternative treatment options is evident across other international survey studies which report that discussions about alternative treatments are not fully explored with patients scheduled for coronary revascularisation.²³ This finding is also apparent in research focusing on non-cardiac elective procedures in which informed consent interactions tend to confirm a predetermined decision rather than facilitate supported decision-making.²⁴ A preference to choose angioplasty as the first line treatment for stable coronary artery disease, rather than medical therapy, has been reported elsewhere.²⁵

Patients' and cardiologists' attitudes about the necessity and appropriateness of the informed consent process for angioplasty were significantly different. Patients in this study placed less value, than cardiologists, on the consent process. Over half agreed that they depended on their doctor to decide what was best for them. A review of patients' preferences for involvement in medical decision-making concluded that patients generally prefer a passive role, but preferences should be discussed on an individualised basis given the considerable variation that exists.²⁶ Patients placing less value on the informed consent process may be because they do not perceive that they can offer a valid contribution. The perception of the doctor as the expert may be an obstacle to the greater engagement and involvement of patients in the PCI informed

consent process. The patient with heart disease is the 'expert' in living with their condition, but the doctor remains the 'expert' in knowing how to treat it. From a policy perspective there has been considerable discussion about the need to change the to move from a 'Doctor knows best' viewpoint to 'The patient in charge' stance. However this is complex as it depends on the nature of the decision to be made, the context within which it occurs, the patients' preference for involvement²⁶. An important step is understanding the patients preference for involvement in the process at an early stage and assess this as regular intervals.²⁷

The process of supported decision making and the use of decision aids has the potential to promote greater patient involvement.²⁸ Another approach to promote patient engagement may be greater involvement of family or friends. This study provides unique information about PCI patient preferences for involvement in informed consent discussions; almost half of the sample would have liked to have a family member or friend with them during the consent process.

In our study, patients reported that they did not usually understand, or remember, the information given to them and, although less in number, many cardiologists shared the same view. Poor levels of patient comprehension and recall about the risks and benefits of PCI treatment has been reported in other international studies dating back over twenty years;^{11-17,23} our study adds an English perspective to these. There appears to have been limited progress in addressing this challenge, but the implementation of educational interventions and decision aids offers two approaches to improve patient knowledge and recall which will optimise the wider decision-making process that overlaps with the PCI informed consent. There is robust evidence to support the widespread adoption of both approaches.²⁸⁻²⁹ Decision aids may be more

effective at encouraging patient participation in the decision making process and promoting accurate risk perceptions.³⁰

An inadequate level of health literacy is a major obstacle to patient participation in managing their own health care and is associated with poor health outcomes and increased health resource use which is costly both in patients suffering and scarce economic resources.³⁰ A large European survey reported that about one-third of patients have insufficient or problematic health literacy.³¹ A similar proportion of our study participants reported needing help to read health information. It is encouraging that 81% of elective participants received written health information ahead of PCI, but it seems likely that content needs redesign to make it more accessible to all. A recent study evaluated health information for heart failure and found that a high level of health literacy would be required to access, understand and act upon the recommendations.³²

We recommend the streamlining of PCI health information (e.g. Patient Information Leaflets) with the co-creation and re-design of core content for a PCI patient curriculum that can be used across hospitals. This would support consistency in health information resources across health settings. Content would be designed and simplified to ensure that health literacy demand would meet the needs of service-users. We also suggest that mapping the PCI patient pathway, which will vary by institution, to enable health professionals to identify potential therapeutic educational 'contact points'. In this way 'chunks' of the patient curriculum can be staged across health professional-patient contact points to avoid information overload. Most importantly the health information should explicitly invite the patient to take part in the supported decision-making process, within which the angioplasty informed consent process is embedded, and emphasise the value of their full participation. This is

important because patient awareness of 'choice' is the first step of the supported decision making process.²² Research indicates that more often than not PCI patients do not fully understand that they have a choice which contributes to them adopting a passive role.¹¹

PCI patients' and cardiologists' shared similar views about which aspects of treatment and risks should be explained to patients as part of the informed consent process. The majority wanted to both give, and receive, detailed information about the possibility of death, and complications, both significant and less significant. Legislative frameworks concerning informed consent will vary by country but the changes in the law in England following the ruling in Montgomery³³ requires doctors to ensure patients are aware of any 'material' risks associated with treatment and to discuss alternatives. The doctor must decide what a 'reasonable person' in the patients position would want to know about the potential risks, no matter how infrequent. The key role of the health professional is to ensure that information is presented in a meaningful way.³⁴ The consent process involves discussions which happen over several episodes of care often with different health professionals which means that the process can be disjointed. We recommend a reconfiguration and standardisation of the PCI patient pathway that allows the doctor, patient, and those close to them, the necessary time to develop a therapeutic relationship. An absence of protected time has been identified as an obstacle to a quality consent process for surgeons³⁵ and we believe that this also applies in the field of interventional cardiology.

The majority of PCI patients wanted to know about all possible risks and there was no difference in the views and preferences of those who had experienced either acute or elective treatment. Risk communication is an important part of information disclosure which occurs within medical-decision making and as part of a valid informed consent

process. Cardiologists need to be supported to enable them to strengthen their skills in communicating risk using effective techniques such as 'teach-back' with the incorporation of decision support.³⁶⁻³⁷ This is important as the way that risk is presented and discussed influences patients' perceptions of their personal risk.³⁶

An accurate understanding of the benefits of PCI is a requirement of a valid consent process. The majority of acute and elective PCI patients shared the view that PCI would relieve symptoms. However over half of the sample perceived that PCI would 'cure' their heart disease. Studies published twenty years ago have reported that elective PCI patients see their treatment as a 'cure',³⁸ and little seems to have changed.³⁹ Acute PCI patients had significantly different views about treatment expectations, which were more accurate than the views of those treated with elective PCI. Most elective PCI patients believed that their treatment would reduce their risk of a future heart attack and increase their lifespan: beliefs that do not reflect clinical guidelines.⁶ It is not clear why this difference exists. The elective PCI patient pathway allows more time for explanation and deliberation but this appears to have no effect on the way patients interpret the benefits of PCI. This is an important and original finding which warrants further consideration. We recommend that future research should identify interventions designed to correct this misconception within a revised informed consent discussion which is the final step in a supported decision making process. A clause on the consent form could be added that explains that PCI is not curative but that secondary prevention offers patients a way to control disease progression.

All studies have limitations and whilst findings from the patient sample are likely to be generalisable given the study design and excellent response rate, the cardiologist

sample is more likely to be subject to non-response bias so must be interpreted with this in mind.

The importance of a robust informed consent process has been given renewed focus as a marker of high quality cardiology care.⁴⁰ Moreover UK policy, which sets out the principles of good practice in the informed consent process for doctors, is being updated.⁴¹ Findings from this study, and others,¹¹ have identified that the informed consent process requires improvement and key learning from this research has helped to shape the update of UK policy. The renewed emphasis on supported decision making reflects a paradigm shift in thinking about the informed consent process with the patients' views and preferences becoming more prominent. This reframing of patient-health professional discussions will no doubt gather momentum across other international health settings but requires the reconfiguration of the PCI patient pathway.

Conclusion

The PCI informed consent process requires improvement to ensure that patients are more involved and accurately understand treatment benefits to make an informed decision. Redesign of the patient pathway is recommended to allow protected time for health professionals to engage in discussions with patients, and those close to them, using evidence based approaches such as 'teach back' and decision support to improve patient comprehension.

Implications for practice

- Patients need to understand fully their role in the angioplasty consent process and need encouragement to participate in it from start to finish with those close to them.

- Patient health information needs to be co-created by patients and health professionals to reduce health literacy demand and support recall and comprehension.
- Most patients want to know about all of the potential risks of coronary angioplasty but overestimate the benefits of angioplasty and perceive it as a cure.
- Cardiologists require training in the use of decision support, communication and patient engagement skills such as 'teach back' to ensure angioplasty patients are fully informed.
- There is a gap between consent policy and clinical practice that could be addressed through service reconfiguration, skills training for health professionals and the re-design of health information resources.

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Table 1: Summary of patient demographic, health and treatment characteristics

Variable	Acute patients	Elective patients	All patients
Age (years) (mean (SD))	66.2 (12.2)	66.8 (11.8)	66.5 (12.0)
Gender			
Male	118 (74.2%)	127 (76.0%)	245 (75.2%)
Female	41 (25.8%)	40 (24.0%)	81 (24.8%)
Employment status			
Full-time employment	35 (22.3%)	27 (16.5%)	62 (19.0%)
Part-time employment	11 (7.0%)	6 (3.7%)	17 (5.2%)
Retired	86 (54.8%)	100 (61.0%)	186 (57.1%)
Unemployed	8 (5.1%)	9 (5.5%)	17 (5.2%)
Other	17 (10.9%)	22 (13.4%)	39 (12.2%)
Help needed with written medical information			
Never	101 (63.9%)	121 (74.2%)	222 (69.2%)
Rarely	23 (14.6%)	15 (9.2%)	38 (11.8%)
Sometimes	18 (11.4%)	19 (11.7%)	37 (11.5%)
Often	10 (6.3%)	1 (0.6%)	11 (3.4%)
Always	6 (3.8%)	7 (4.3%)	13 (4.0%)
Frequency of chest pains in last 4 weeks			
None	34 (21.9%)	34 (21.1%)	68 (21.5%)

Less than 1 per week	30 (19.4%)	25 (15.5%)	55 (17.4%)
1-2 per week	24 (15.5%)	30 (18.6%)	54 (17.1%)
3 or more per week	26 (16.8%)	33 (20.5%)	59 (18.7%)
1-3 per day	25 (16.1%)	26 (16.1%)	51 (16.1%)
4 or more per day	16 (10.3%)	13 (8.1%)	29 (9.2%)

*(frequency and valid percentages given except where indicated)

Table 2: Summary of cardiologist characteristics

Variable	Frequency (valid %)
Gender	
Male	108 (91.5%)
Female	10 (8.5%)
Position	
Consultant Cardiologist (Interventionalist)	98 (83.1%)
Consultant Cardiologist (Non-Interventionalist)	1 (0.8%)
Specialist Registrar/Fellow	17 (14.4%)
Other	2 (1.7%)
Workplace	
Regional tertiary cardiac centre, on-site cardiac surgery	61 (51.7%)
Non-surgical tertiary PCI centre	23 (19.5%)
Stand-alone, non-surgical PCI centre	34 (28.8%)
Frequency of PCI consent interactions per month	
None	1 (0.8%)
1-25 times	84 (67.7%)
26-50 times	30 (24.2%)
51-75 times	8 (6.5%)
Over 75 times	1 (0.8%)
Frequency of operator conducting informed consent discussions for PCI procedures performed	

Always (100%)	29 (23.4%)
Mostly (75%)	45 (36.3%)
Usually (50%)	20 (16.1%)
Sometimes (25%)	30 (24.2%)
Annual volume of PCI procedures at centre	
200-400	14 (11.9%)
400-1000	41 (34.7%)
1000-2000	47 (39.8%)
Over 2000	16 (13.6%)

*(frequency and valid percentages given except where indicate