

Cost-Effectiveness of Fractional Flow Reserve-Guided Percutaneous Coronary Intervention in Patients with Stable Coronary Disease: Results from the FAME 2 trial

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Disclosure Statement of Financial Interest

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

Affiliation/Financial Relationship

- Grant/Research Support
- Consulting Fees/Honoraria
- Major Stock Shareholder/Equity
- Royalty Income
- Ownership/Founder
- Intellectual Property Rights
- Other Financial Benefit

Company

- St. Jude Medical, NIH

- HeartFlow

FAME 2 was sponsored by St. Jude Medical

Background

- **The FAME 2 trial is a multicenter, international, randomized study comparing fractional flow reserve (FFR)-guided percutaneous coronary intervention (PCI) to best medical therapy (MT) in patients with stable coronary disease.**
- **The study was stopped early because of a significantly higher rate of the composite endpoint of death, MI and urgent revascularization in patients assigned to MT.**

Trial Design

Stable patients with 1, 2, or 3 vessel CAD evaluated for PCI with DES
n=1220

FFR in all target lesions

Randomized Trial

At least 1 stenosis with
FFR ≤ 0.80 (n=888)

Randomization 1:1

PCI + MT

MT

Registry

All FFR > 0.80
(n=322)

MT

50% randomly assigned
to follow-up

Primary Endpoint: Death, MI, Urgent Revascularization at 2 years

Trial Results

	FFR-Guided PCI (n=447)	%	MT (n=441)	P-Value
Primary Endpoint	4.3		12.7	<0.001
Death	0.2		0.7	0.31
Myocardial Infarction	3.4		3.2	0.89
Urgent Revascularization	1.6		11.1	<0.001
Free from Angina (1 month)	71		48	<0.001

De Bruyne, et al. New Engl J Med 2012;367:991-1001.

Objective

- The aim of this presentation is to describe the economic and quality of life implications of the FFR-guided PCI strategy in the FAME 2 trial.

Methods

- Direct medical costs of the index procedure and hospitalization were calculated from actual resource consumption.
- Follow-up events were assigned costs based on Medicare's reimbursement rate per diagnosis related group.
- Cumulative costs over 12 months were calculated monthly using an incremental approach.

Methods

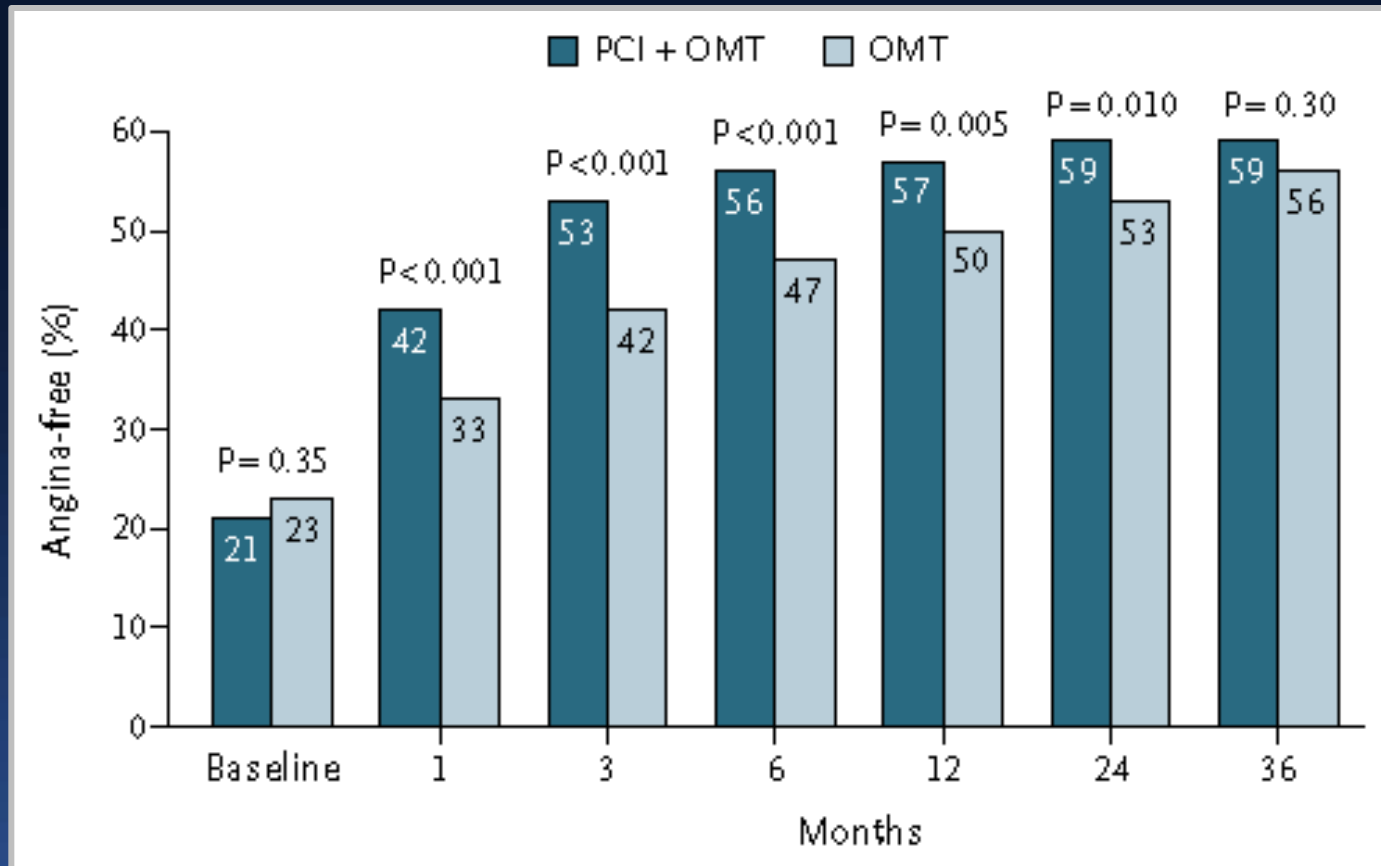
- Angina was assessed at baseline, 1, 6 and 12 months.
- Patient utility (quality of life) was assessed using the EQ-5D with US weights at baseline, 1 and 12 months.
 - Because the trial was stopped early, only 11% of patients had 12 month utility measured. We used the change in scores from baseline to 1 month to project quality adjusted life-years (QALYs).
- We calculated the cost-effectiveness ratio during the first 12 months (in-trial), and because the treatment effect is likely to extend further, we projected the analysis out to 3 years.

Methods

- We assumed that the one year cost difference persisted in subsequent follow-up.
- We estimated the utility difference in 2 ways:
 - Improved by PCI (in both arms) and lasted 1 year
 - One month difference declined linearly over 3 years

Methods

Freedom from Angina in COURAGE



Weintraub, et al. New Engl J Med 2008;359:677-687.

Methods

- We assumed that the one year cost difference persisted in subsequent follow-up.
- We estimated the utility difference in 2 ways:
 - Improved by PCI (in both arms) and lasted 1 year
 - One month difference declined linearly over 3 years
- The Cost-Effectiveness Ratio was calculated as:

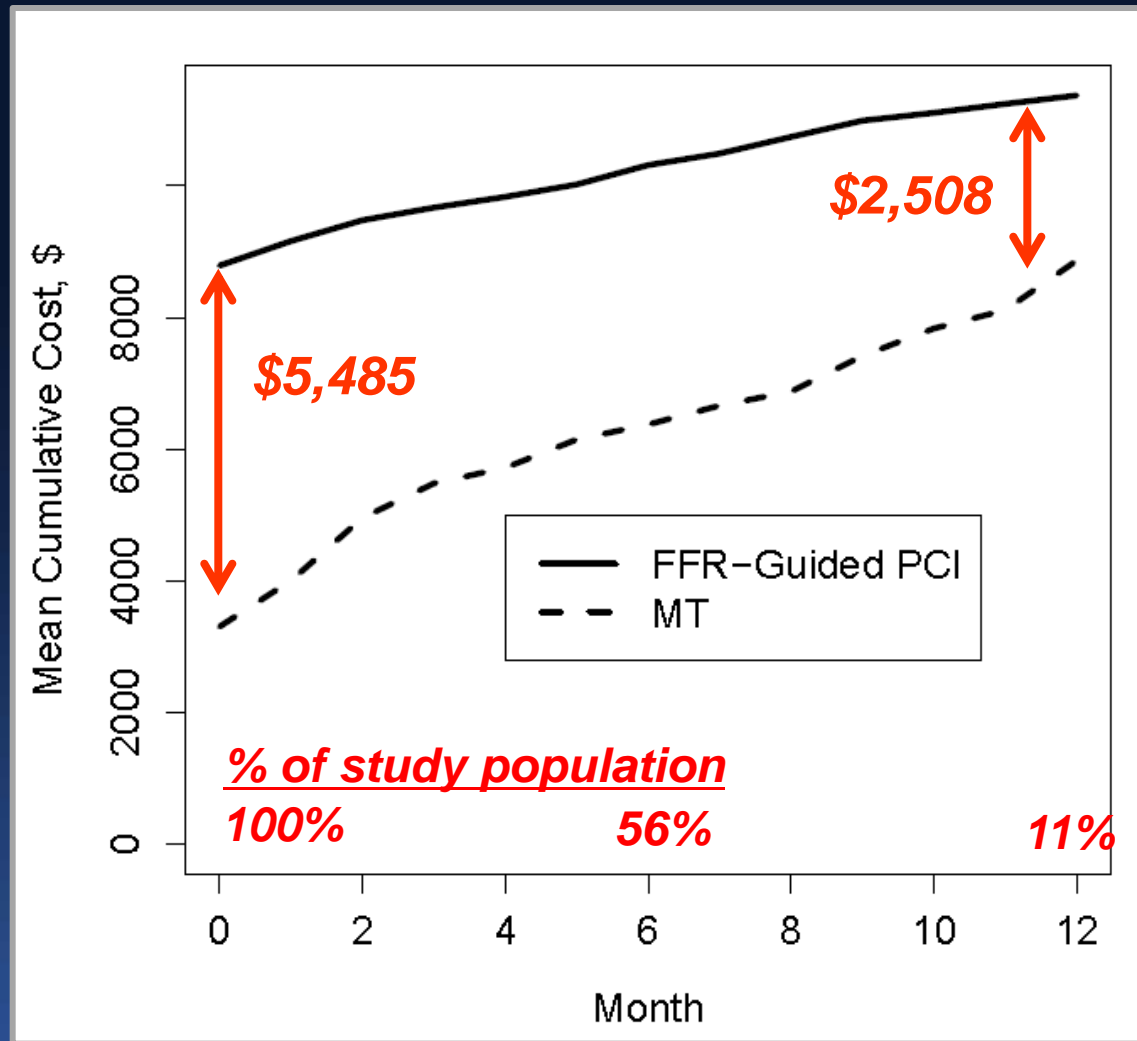
$$\frac{(\text{Cost}_{\text{FFR-PCI}} - \text{Cost}_{\text{MT}})}{(\Delta \text{QALY}_{\text{FFR-PCI}} - \Delta \text{QALY}_{\text{MT}})}$$

Results

One Year Cost Estimates Per Patient

	FFR-Guided PCI	MT
Baseline	\$8,790	\$3,305
Drug-Eluting Stent(s)	\$4,304	\$48
Follow-up	\$2,584	\$5,561
Revascularization	\$442	\$3,928
Total	\$11,374	\$8,866

Cumulative Costs over 12 Months



Results

Quality of Life at 1 Month

	FFR-Guided PCI	MT	p-value
Angina (%)			
Class 0-1	89	71	<0.001
Class 2-4	11	29	<0.001
Utility Change	0.054	0.003	<0.001

FFR-Guided PCI Cost-Effectiveness

In-trial results

$\$2,500 / 0.047 \text{ QALY} = \$53,000 / \text{QALY}$

Three Year Projection




$\$2,500 / 0.079 \text{ QALY} = \$32,000 / \text{QALY}$

Cost-Effectiveness

CE Benchmarks:

Hemodialysis \approx \$50,000 / QALY

WHO GDP std \approx \$150,000 / QALY

-  >\$150,000 / QALY
-  \$50K-150K / QALY
-  <\$50,000 / QALY




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COURAGE	Angio-Guided PCI vs Medical Therapy	\geq \$168,000 / QALY

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FAME 2	FFR-Guided PCI vs Medical Therapy	\$32,000 / QALY

Limitations

- **This study is limited by the short time horizon.**
- **Cost-effectiveness estimates have wide confidence limits due to**
 - **Model assumptions**
 - **Parameter uncertainty**
 - **Statistical uncertainty**

Conclusion:

- **FFR-Guided PCI has higher initial cost than medical therapy.**
- **The cost gap narrows by >50% at one year.**
- **Angina and quality of life are significantly improved by FFR-Guided PCI compared to medical therapy.**
- **FFR-Guided PCI appears to be economically attractive in cost-effectiveness analysis.**