



## Original Article

# The report on the Indian coronary intervention data for the year 2017—National Interventional Council



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## 1. Introduction

The interventional registry established by the National Interventional Council (NIC), Cardiological Society of India (CSI), is responsible for the collection and analysis of data on coronary and noncoronary interventions. The prevalence of coronary artery disease (CAD) is increasing in India,<sup>1,2</sup> and as a result, there is an increasing need for interventional procedures. Furthermore, there is a rise in the number of interventional cardiologists, inception of new cardiac centers, closure of others, and adoption of latest procedures such as transcatheter aortic valve implantation (TAVI). Therefore, a comprehensive evaluation of the data is required to understand the service requirements across this vast country.

## 2. Methods

The NIC data pro forma was prepared and made available at NIC website and also distributed to all the members of the CSI. Both the filled up hard copies received from the centers and electronically uploaded data were clubbed and made into comprehensive excel data. All the interventional data pertaining to all the catheterization laboratory procedures from January 1, 2017, to December 31, 2017, were collected from all the centers across the country. These data

were analyzed for various procedures and parameters using MS Office Excel software. The results on key metrics were compared with the data from previous years. This year, we further evaluated data on various subsets to capture prevailing practices across the country. These included interventions to the left main stem (LMS), coronary bypass grafts, chronic total occlusions (CTOs), and TAVI. The pro forma was distributed to all the members of the CSI and was also made available on the NIC website. The results on key metrics were compared with the data from previous years.

## 3. Results

A total of 3,87,416 percutaneous coronary intervention (PCI) procedures were performed in 705 centers. This equates to a 3.7% growth when compared with the data available from 2016 (Fig. 1). There was a net gain of 7 centers performing PCI procedures across the country. Adjunctive imaging and devices to optimize PCI were used in a small proportion of cases. Intravascular ultrasound (IVUS) and fractional flow reserve or (FFR) measurement were used in 4490 (1.16%) and 5296 (1.37%) procedures, respectively. Rotational atherectomy for plaque modification was used in 3769 (0.97%) procedures.

Age group analysis revealed that 12.24% of procedures were performed in patients younger than 40 years and that nearly 17% of procedures were performed in patients older than 70 years. Demographic analysis revealed that nearly 70% of patients were male. There has been a rise in the number of female patients undergoing PCI procedures when compared with previous years. The major indications for PCI included non-ST segment elevation myocardial infarction (NSTEMI) or unstable angina (25.8%), followed by chronic

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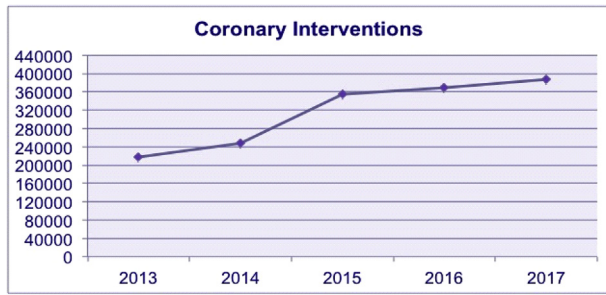


Fig. 1. Graph comparing coronary interventions in the previous years. There was a 3.7% increase in 2017 when compared with 2016.

stable angina (19.34%), ST segment elevation myocardial infarction (STEMI) (16.17%), and primary PCI (PPCI) for STEMI (13.74%). The trends in terms of number of procedures per center were similar to those of previous years. The number of PCI procedures carried out in centers performing <200, 201–500, 501–1000, 1001–2000, and > 2001 procedures is shown in Fig. 2. It is of note that 3.3% of centers still do perform more than 20% of the work.

A total of 5,11,389 stents have been deployed; of which, 4,94,769 (96.75%) were drug-eluting stents (DES) (Table 1). PCI was performed for single-vessel disease in 80.24% and for multivessel disease in 19.76% of cases respectively. More than 60% of PCI were performed through the radial route. In nearly 8000 (2%) procedures, balloon dilatation without stent implantation was the only intervention. Glycoprotein IIb/IIIa inhibitor was used in 70,467 procedures (18.19%), and bivalirudin was used in 3374 procedures (0.87%). Femoral occlusion devices, such as angioseal, were used in 9025 patients (2.33%). The reported in hospital mortality was 1.12% for all PCIs and 2.78% for PPCI. Emergency CABG had to be carried out in 0.46%; acute renal failure due to contrast-induced nephropathy and major bleeding episodes were noted in 1.11% and 0.27% of cases, respectively. Most of the trends were by and large similar to those of previous years.

#### 4. Subset analysis

##### 4.1. Interventions in acute myocardial infarctions

There were approximately 30,00,000 STEMI reported in India last year, of which only 12,00,000 were thrombolysed (as per

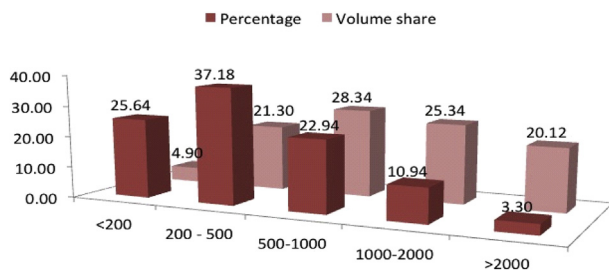


Fig. 2. Bar charts showing workload distribution across all PCI-performing centers. PCI (percutaneous coronary intervention).

Table 1

Table comparing the total number of stents and share of DESs implanted in 2017 when compared with 2016.

Number of stents	2015	2016	2017
Total stents used	4,33,650	4,78,770	5,11,389
Drug-eluting stents (DESs)	4,15,350	4,54,159	4,94,769
% of DESs in total stents	95.78%	94.86%	96.75%

industry data), and only 53,416 of them underwent primary PCI (PPCI (Fig. 3). Thrombus aspiration was carried out in 18,635 (34.8% of PPCI) patients. Cardiogenic shock (CS) was ascribed to 9096 (17% of PPCI) patients. A total of 632 patients with CS were treated with an intra-aortic balloon pump.

#### 4.2. Complex coronary interventions

Interventions to the left main stem, CTOs, and grafts were included in this category. Interventions to the LMS were performed in 9600 patients (2.49% of all interventions). IVUS guidance was used in 2126 patients (22% of all LMS PCIs). More than 1000 LMS interventions were carried out in the context of acute myocardial infarction. PCI to a CTO was attempted in 14,000 patients (3.6% of all PCIs); of which, the majority of the interventions were through the antegrade approach. The antegrade approach was used in 13,609 patients, and the retrograde approach, in 391 patients. Micro-catheters were used in 9237 cases (66% of all CTOs).

The total number of PCI procedures to bypass grafts was 3160 (0.8% of all interventions). Of those, 2514 were to venous grafts and 646 were to left internal mammary artery conduits. The distal protection device was used in 685 cases (27% of all venous graft PCIs).

#### 4.3. TAVI data

A total of 179 TAVI devices were implanted last year. These included trial valves as well. The core valve by Medtronic (Medtronic Inc, Minneapolis, Minnesota) was implanted in 106 patients. The Edwards Sapiens device (Edwards Lifesciences Corporation, Irvine, California) was implanted in 34 patients. The Hydra valve (Vascular Innovations, Thailand) and Myval (Meril Life Sciences, Vapi, Gujarat, India) were implanted in 14 and 25 cases, respectively.

### 5. Discussion

Coronary interventions in India continue to increase year by year.<sup>3</sup> However, anticipated exponential increase in the number of stents implanted following price correction did not materialize, suggesting judicious use of these devices in the majority of cases.

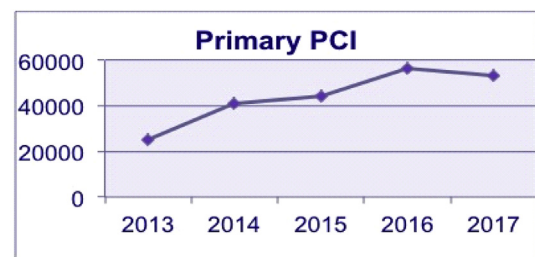


Fig. 3. Line diagram to show the steady rate of PPCI numbers. PPCI, primary percutaneous coronary intervention.

Table 2

Comparison of funding sources for PCI.

	2015	2016	2017
Own	41.38%	39.42%	39.39%
Government	40.87%	43.15%	43.68%
Private insurance	17.75%	17.43%	16.93%

PCI, percutaneous coronary intervention.

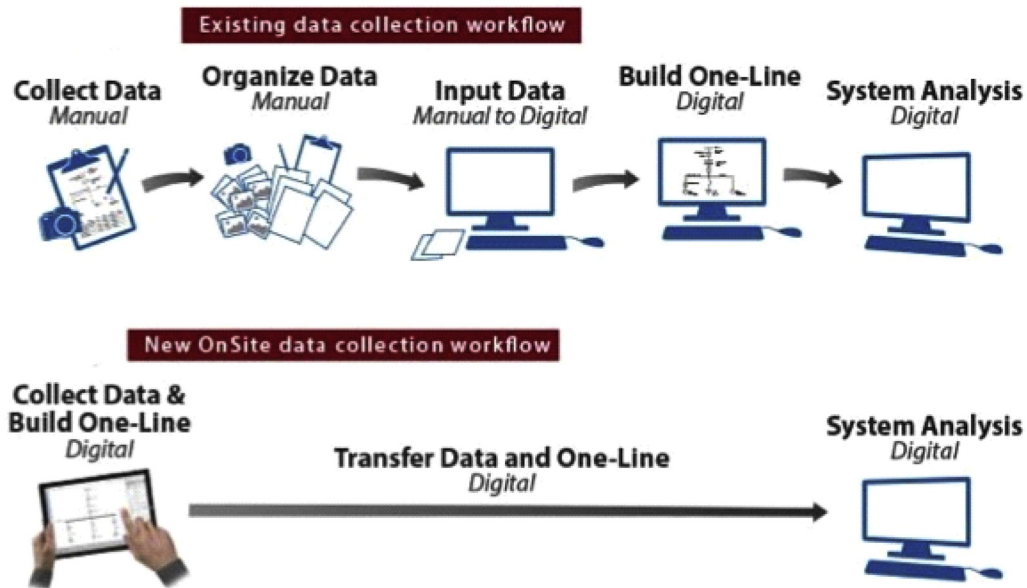


Fig. 4. Existing and proposed data collection algorithms.

There was a small increment in the number of centers performing PCI and the total number of overall procedures.<sup>5</sup> Other key findings of the analysis were as follows: 3.3% of the centers do perform more than 20% of the procedures and 12.2% of procedures were performed in patients younger than 40 years of age. Furthermore, 30% of PCI procedures were performed in female patients, a clear rise when compared with previous years, suggesting decreasing gender gap. Funding for PCIs was by insurance in the majority of cases (43% by government, 17% by private firms, and self-finance in 40%) (Table 2). Interventions to complex cases are increasing with adoption of newer techniques, for example, microcatheter usage in 60% of CTO cases. Outcomes remain good with reported 1.12% mortality following PCI. However, the interventions for PPCI remained static. This may well be due to wider adoption of the pharmacoinvasive approach. Large-scale randomized clinical trials are required to assess the feasibility, safety, and efficacy of the pharmacoinvasive approach in India. The pharmacoinvasive approach can be used to meet service requirements in a vast country such as India because of wide geographic area, lack of centers offering PPCI in the close vicinity of the patient and also for financial reasons.<sup>4</sup> Panel discussion following data presentation, while agreeing on the perceived reasons behind PPCI procedures being static, also commented on the need for accurate data. Wide variability in data reporting was noted, with some centers excelling than the others. The NIC chairman and the panel felt accurate data collection helps in real-time capture of individualized data that are robust and have enormous consequent research potential. New online data collection has been proposed and will be implemented in parallel to the existing system over the coming years (Fig. 4).

## 6. Limitations

Limitations associated with a retrospective analysis are worthy of note. The data are collected from 705 centers, only which constitutes approximately 70% of the total Indian centers. Although there were limitations in collecting data from small centers across

the corners of this vast country, majority of interventions from larger centers were captured and are thus considered representative. Most of the data collected are by voluntary reporting by individual operators and hospitals at the end of the year. Lack of individualized patient data collection meant analysis on the patient level was not feasible to accurately look at clinical outcomes.

## 7. Conclusions

Coronary interventions in India continue to increase with more and more centers offering PCI. Structural interventions such as TAVI are reported this year. Web-based prospective data collection at each patient level has been proposed. Despite stent price capping, judicious use of coronary stents, as reflected by growth in procedures similar to that of previous years, was noted.

## Disclosures

None.

## Conflict of interest

All authors have none to declare.

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