

## ORIGINAL ARTICLE

# The activity of the interventional cardiology centers in Romania: a 2016 overview and 2014-2016 trends

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**Abstract:** This article summarizes the activity of the interventional cardiology centers of Romania during 2016. All interventional cardiology centers from Romania were requested to fill a standard reporting model. Data was divided in 4 categories: coronary interventions, peripheral interventions, other procedures like TAVI, mitralclip, aortic endoprosthesis, interventions in structural heart diseases and outcomes during hospitalization. The report highlights the differences in total number of percutaneous coronary interventions (PCI), percutaneous procedures, stents and drug eluting stents during 2014 to 2016.

**Keywords:** interventional cardiology, percutaneous coronary interventions, stents

**Rezumat:** Articolul sintetizează activitatea centrelor de cardiologie intervențională din România în anul 2016. Toate centrele de cardiologie intervențională din România au fost rugate să completeze un model standard de raportare. Datele au fost împărțite în 4 categorii: intervenții coronariene, intervenții periferice, alte proceduri precum TAVI, mitralclip, endoproză aortică, intervenții în boala cardiacă structurală și evenimentele din timpul spitalizării. Raportul evidențiază diferențele dintre numărul total de intervenții coronariene percutane, numărul total de proceduri percutane, numărul total al stenturilor implantate între anii 2014 și 2016.

**Cuvinte cheie:** cardiologie intervențională, intervenții coronariene percutane, stenturi

This article summarizes the activity of the interventional cardiology centers of Romania during 2016 and it highlights trends in different areas of intervention in interventional cardiology between 2014 to 2016.

All started in 2014 with the initiative of the interventional cardiology working group of Romanian Society of Cardiology. The working group has proposed that every interventional cardiology center from Romania to use a standard reporting model to report annually their activity. Data was divided in 4 categories: coronary interventions, peripheral interventions, other procedures like TAVI, mitralclip, aortic endoprosthesis, interventions in structural heart disease), and the final category of outcomes during hospitalization. All information are easy to collect and report and have practical importance, like total number of coronary angioplasty, total number of drug eluting stent that were implanted, the utilization of intracoronary imaging like OCT, IVUS, different types of peripheral angioplasty (carotid or renal angioplasty).

The purpose of this initiative was to have a clear picture of the magnitude of the activity of interventional cardiologist at a national level, to know the total number of different types of procedures, and to identify any tendencies.

This report summarizes the data from 2016 provided by 33 out of 35 public and private interventional cardiology centers of Romania (Table 1). Currently, there are 35 interventional cardiology centers in Romania, of which 14 are private centers and 21 public centers with 49 functional angiographs. In 2016, in Romania were 85 independent interventional cardiologists and 61 interventional cardiologists in training.

A direct comparison of 2014 with 2015 and 2016 was done, that highlights the continuous increase in the activity of the interventional cardiology centers in Romania. The total number of PCIs in 2015 increased with 35% compared to 2014, while in 2016 there was a small increase compared to 2015 in total number of PCI, with only 5% (Figure 1-4). In 2016, in Romania,

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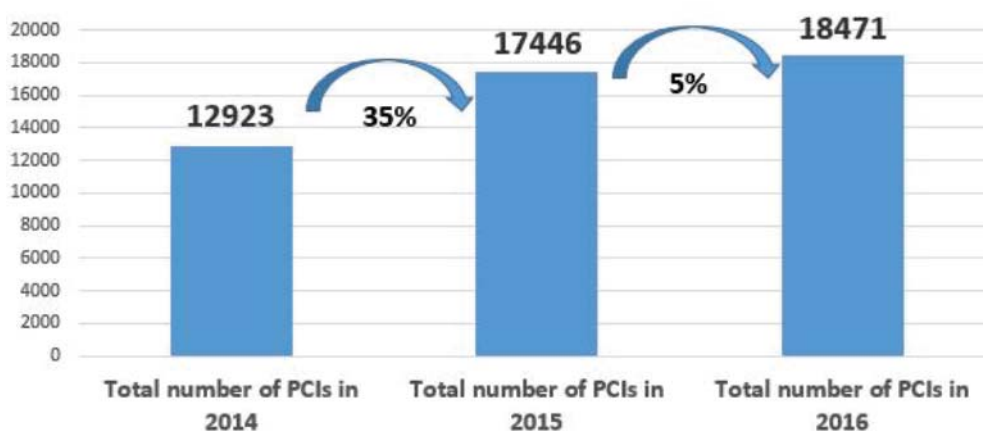


Figure 1. Total number of PCIs in 2014, 2015 and 2016 in Romania.

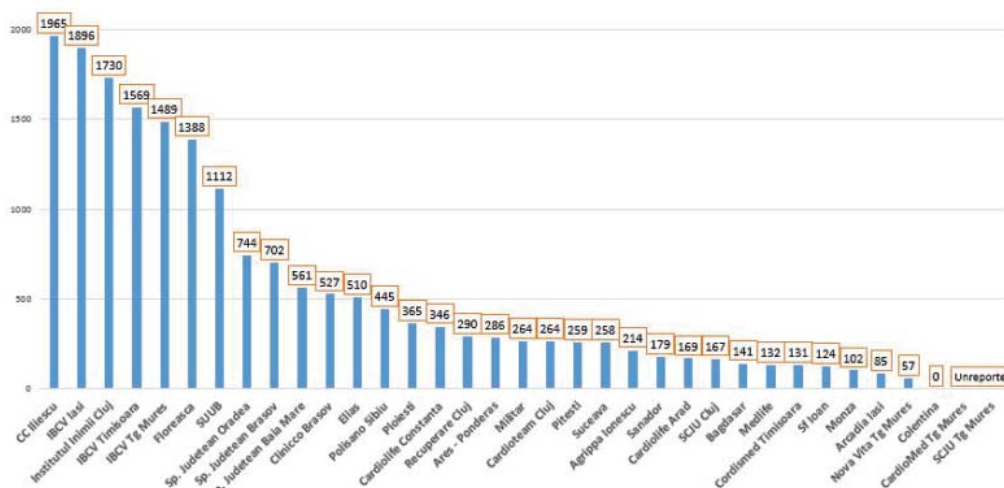


Figure 2. Total number of PCIs in 2016 in all interventional centers from Romania.

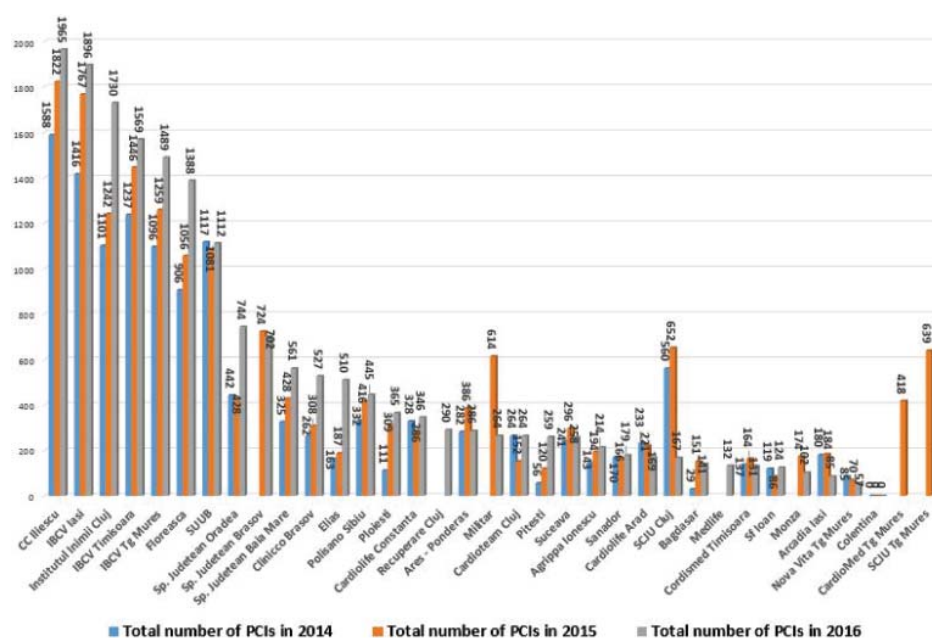


Figure 3. Total number of PCIs in 2014, 2015 and 2016 in all interventional centers from Romania.

**Table 1. Reported data from Interventional Cardiology Centers in Romania in 2016**

| City   | Bucharest    |      |           |                 |         |          |       |          |
|--|--------------|------|-----------|-----------------|---------|----------|-------|----------|
| Hospital   | C.C. Iliescu | SUUB | Floreasca | Agrippa Ionescu | Militar | Bagdasar | Elias | Sf. Ioan |
| Nr. of Cathlabs  | 3            | 2    | 1         | 1               | 1       | 1        | 2     | 1        |
| Nr. Independent operators                                  | 8            | 5    | 4         | 2               | 3       | 2        | 6     | 2        |
| Nr. of in training operators                               | 12           | 7    | 3         | 0               | 0       | 2        | 1     | 0        |
| Total number of procedures (diagnostic + PCI) <sup>1</sup> | 5943         | 2161 | 2461      | 1456            | 2183    |          | 1078  | 1043     |
| <b>Coronary Interventions</b>                              |              |      |           |                 |         |          |       |          |
| Coronarography   | 4204         | 2118 | 2392      | 1242            | 973     | 438      | 557   | 635      |
| Total nr. of PCI   | 1965         | 1112 | 1388      | 214             | 264     | 141      | 510   | 124      |
| PCI without stents   | 109          | 40   |           | 8               | 2       | 0        | 37    | 0        |
| PCI with stents  | 1856         | 1072 |           | 206             | 262     | 141      | 473   | 124      |
| STEMI  | 1026         | 1001 | 880       | 3               | 180     | 5        | 345   | 14       |
| Stents per patient <sup>2</sup>                            | 1.5          | 1.5  | 1.12      | 1.37            | 1.8     | 1.75     | 1.09  | 1.41     |
| Total nr. of stents  | 2962         | 1673 | 1564      | 294             | 588     | 247      | 557   | 176      |
| Nr. of DES   | 2633         | 907  | 1270      | 291             | 118     | 204      | 382   | 98       |
| DES/stents ratio (%)                                       | 88.9         | 54.2 | 81.2      | 98.9            | 20      | 82.6     | 68.6  | 55.6     |
| BVS  | 0            | 0    | 0         | 1               | 0       | 0        | 0     | 0        |
| Cutting, Scoring   | 80           | 2    | 10        | 0               | 3       | 1        | 6     | 0        |
| Rotablation  | 6            | 0    | 0         | 2               | 0       | 0        | 0     | 0        |
| FFR/IFR  | 33           | 5    | 41        | 9               | 0       | 0        | 0     | 0        |
| IVUS   | 23           | 2    | 12        | 0               | 0       | 0        | 0     | 0        |
| OCT  | 0            | 2    | 5         | 7               | 0       | 0        | 0     | 17       |
| <b>Peripheral interventions</b>                            |              |      |           |                 |         |          |       |          |
| Peripheral PTA <sup>3</sup>                                | 296          | 0    |           | 49              | 193     | 1        | 2     | 43       |
| Renal PTA  | 14           | 3    |           | 2               | 14      | 0        | 0     | 14       |
| Carotid PTA  | 18           | 0    |           | 35              | 5       | 0        | 0     | 0        |
| Total nr. of stents in peripheral PTA                      | 140          | 0    |           |                 | 380     | 2        | 0     | 25       |
| Peripheral angiography                                     | 789          | 50   |           | 487             | 538     | 43       | 65    | 284      |
| <b>Other interventions</b>                                 |              |      |           |                 |         |          |       |          |
| TAVI   | 24           | 0    | 0         | 0               | 3       | 0        | 0     | 0        |
| MitraClip  | 0            | 0    | 0         | 0               | 0       | 0        | 0     | 0        |
| Aortic endoprosthesis                                      | 11           | 0    | 0         | 0               | 2       | 0        | 0     | 0        |
| Interventions in structural heart disease <sup>4</sup>     | 0            | 0    | 0         | 0               | 0       | 0        | 0     | 0        |
| <b>MACE</b>  |              |      |           |                 |         |          |       |          |
| Death  | 60           | 80   |           | 0               |         | 0        | 5     | 0        |
| Periprocedural AMI   | 2            | 5    |           | 0               |         | 1        | 2     | 0        |
| Stroke   | 4            | 10   | 5         | 0               |         | 1        | 0     | 0        |
| Stent Thrombosis   | 3            | 3    | 0         | 0               |         | 0        | 0     | 0        |
| Major bleeding <sup>5</sup>                                | 4            | 5    |           | 2               |         | 0        | 0     | 0        |
| Coronary rupture   | 0            | 2    |           | 0               |         | 0        | 0     | 0        |

Table 1. continued

| City   | Bucharest   |              |                 |           |         |
|--|-------------|--------------|-----------------|-----------|---------|
| Hospital   | Sanador     | Ares - Monza | Ares - Ponderas | Colentina | Medlife |
| Nr. Of Cathlabs  | 1           | 2            | 1               | 1         | 1       |
| Nr. Independent operators  | 11          | 10           | 5               | 2         | 2       |
| Nr. of in training operators                                     | 0           | 0            | 0               | 1         | 0       |
| <b>Total number of procedures (diagnostic + PCI)<sup>1</sup></b> | <b>2379</b> | <b>463</b>   | <b>844</b>      | <b>43</b> |         |
| <b>Coronary Interventions</b>                                    |             |              |                 |           |         |
| Coronarography   | 1617        | 280          | 411             | 43        | 271     |
| Total nr. of PCI   | 179         | 102          | 286             |           | 132     |
| PCI without stents   | 8           |              | 5               |           | 9       |
| PCI with stents  | 171         | 102          | 281             |           | 123     |
| STEMI  | 9           |              |                 |           | 4       |
| Stents per patient <sup>2</sup>                                  | 1.46        | 1.6          | 2.0             |           | 1.3     |
| Total nr. of stents  | 262         | 159          | 549             |           | 171     |
| Nr. of DES   | 260         | 159          | 549             |           | 166     |
| DES/stents ratio (%)   | 99.2        | 100          | 100             |           | 97      |
| BVS  | 2           | 4            | 47              |           | 0       |
| Cutting, Scoring   | 2           | 4            | 3               |           | 9       |
| Rotablation  | 0           | 5            | 5               |           | 0       |
| FFR/IFR  | 1           | 0            | 0               |           | 0       |
| IVUS   | 0           | 0            | 0               |           | 0       |
| OCT  | 0           | 0            | 0               |           | 0       |
| <b>Peripheral interventions</b>                                  |             |              |                 |           |         |
| Peripheral PTA <sup>3</sup>                                      | 67          | 16           | 25              |           | 28      |
| Renal PTA  | 4           | 4            | 1               |           | 6       |
| Carotid PTA  | 2           | 8            | 7               |           | 20      |
| Total nr. of stents in peripheral PTA                            | 32          | 31           | 31              |           | 70      |
| Peripheral angiography   | 388         | 22           | 27              | 9         | 142     |
| <b>Other interventions</b>                                       |             |              |                 |           |         |
| TAVI   | 3           | 2            | 2               |           | 0       |
| MitraClip  | 0           | 0            | 3               |           | 0       |
| Aortic endoprosthesis  | 4           | 1            | 6               |           | 0       |
| Interventions in structural heart disease <sup>4</sup>           | 0           | 4            | 32              |           | 22      |
| <b>MACE</b>  |             |              |                 |           |         |
| Death  | 0           | 0            | 0               |           | 0       |
| Periprocedural AMI   | 0           | 0            | 0               |           | 0       |
| Stroke   | 0           | 1            | 1               |           | 0       |
| Stent Thrombosis   | 0           | 0            | 0               |           | 0       |
| Major bleeding <sup>5</sup>                                      | 0           | 1            | 2               |           | 0       |
| Coronary rupture   | 0           | 0            | 0               |           | 0       |

Table 1. continued

| City   | Cluj Napoca            |            |            |            | Iași        |            |
|--|------------------------|------------|------------|------------|-------------|------------|
| Hospital   | Institutul Inimii Cluj | SCJU Cluj  | Cardioteam | Recuperare | IBCV Iași   | Arcadia    |
| Nr. of Cathlabs  | 2                      | 1          | 1          | 1          | 2           | 1          |
| Nr. Independent operators  | 8                      | 3          | 1          | 1          | 6           | 3          |
| Nr. of in training operators                                     | 4                      | 7          | 2          | 2          | 3           | 0          |
| <b>Total number of procedures (diagnostic + PCI)<sup>1</sup></b> |                        | <b>464</b> |            | <b>909</b> | <b>3573</b> | <b>586</b> |
| <b>Coronary Interventions</b>                                    |                        |            |            |            |             |            |
| Coronarography   | 3452                   | 297        | 432        | 766        | 3340        | 464        |
| <b>Total nr. of PCI</b>  | <b>1730</b>            | <b>167</b> | <b>264</b> | <b>290</b> | <b>1896</b> | <b>85</b>  |
| PCI without stents   | 134                    | 8          | 4          | 32         | 158         | 2          |
| PCI with stents  | 1596                   | 159        | 260        | 258        | 1738        | 83         |
| STEMI  | 764                    | 54         | 1          | 6          | 887         | 0          |
| Stents per patient <sup>2</sup>                                  | 1.43                   | 1.81       | 1.8        | 1.3        | 1.19        | 1.2        |
| Total nr. of stents  | 2475                   | 303        | 475        | 298        | 2084        | 110        |
| Nr. of DES   | 1363                   | 281        | 427        | 270        | 1849        | 110        |
| DES/stents ratio (%)   | 55                     | 92.7       | 89.9       | 90.6       | 88.7        | 100        |
| BVS  | 0                      | 0          | 48         | 0          | 0           | 0          |
| Cutting, Scoring   | 12                     | 0          | 12         | 0          | 0           | 0          |
| Rotablation  | 0                      | 0          | 0          | 0          | 0           | 0          |
| FFR/IFR  | 3                      | 0          | 1          | 0          | 0           | 0          |
| IVUS   | 16                     | 0          | 0          | 0          | 0           | 0          |
| OCT  | 1                      | 0          | 2          | 0          | 0           | 0          |
| <b>Peripheral interventions</b>                                  |                        |            |            |            |             |            |
| Peripheral PTA <sup>3</sup>                                      | 52                     | 28         | 15         | 29         | 49          | 14         |
| Renal PTA  | 18                     | 2          | 5          | 0          | 10          | 1          |
| Carotid PTA  | 12                     | 6          | 26         | 0          | 29          | 7          |
| Total nr. of stents in peripheral PTA                            | 36                     |            | 21         | 23         | 64          | 10         |
| Peripheral angiography   | 261                    | 98         | 36         | 143        | 581         | 64         |
| <b>Other interventions</b>                                       |                        |            |            |            |             |            |
| TAVI   | 0                      | 0          | 0          | 0          | 11          | 0          |
| MitraClip  | 0                      | 0          | 0          | 0          | 0           | 0          |
| Aortic endoprosthesis  | 2                      | 0          | 0          | 0          | 8           | 0          |
| Interventions in structural heart disease <sup>4</sup>           | 20                     | 0          | 4          | 0          | 3           | 3          |
| <b>MACE</b>  |                        |            |            |            |             |            |
| Death  | 45                     | 7          | 0          | 0          | 57          | 0          |
| Periprocedural AMI   | 12                     | 0          | 2          | 0          | 0           | 0          |
| Stroke   | 15                     | 0          | 2          | 0          | 1           | 1          |
| Stent Thrombosis   | 10                     | 0          | 0          | 0          | 0           | 0          |
| Major bleeding <sup>5</sup>                                      | 11                     | 3          | 1          | 0          | 3           | 0          |
| Coronary rupture   | 2                      | 0          | 0          | 0          | 0           | 0          |

Table 1. continued

| City   | Târgu Mureș   |            |               | Timișoara |                |           |
|--|---------------|------------|---------------|-----------|----------------|-----------|
| Hospital   | IBCV Tg Mureș | Cardio Med | SCJU Tg Mureș | Nova Vita | IBCV Timișoara | Cordismed |
| Nr. of Cathlabs  | 2             | Unreported | Unreported    | 1         | 1              | 1         |
| Nr. independent operators                                  | 6             |            |               | 5         | 6              | 3         |
| Nr. of in training operators                               | 2             |            |               | 0         | 3              | 3         |
| Total number of procedures (diagnostic + PCI) <sup>1</sup> | 4545          |            |               | 1037      | 3175           |           |
| <b>Coronary Interventions</b>                              |               |            |               |           |                |           |
| Coronarography   | 4398          |            |               | 900       | 3175           | 415       |
| Total nr. of PCI   | 1489          |            |               | 57        | 1569           | 131       |
| PCI without stents   | 94            |            |               | 1         | 76             | 11        |
| PCI with stents  | 1395          |            |               | 56        | 1393           | 120       |
| STEMI  | 278           |            |               | 0         | 1041           | 0         |
| Stents per patient <sup>2</sup>                            | 1.3           |            |               | 1.1       | 1.78           | 1.74      |
| Total nr. of stents  | 1868          |            |               | 63        | 2492           | 209       |
| Nr. of DES   | 1804          |            |               | 61        | 1701           | 198       |
| DES/stents ratio (%)                                       | 96.6          |            |               | 96.8      | 68.2           | 94.7      |
| BVS  | 16            |            |               | 0         | 0              | 3         |
| Cutting, Scoring   | 23            |            |               | 0         | 0              | 0         |
| Rotablation  | 22            |            |               | 0         | 0              | 1         |
| FFR/IFR  | 80            |            |               | 0         | 5              | 0         |
| IVUS   | 0             |            |               | 0         | 3              | 0         |
| OCT  | 60            |            |               | 0         | 5              | 0         |
| <b>Peripheral interventions</b>                            |               |            |               |           |                |           |
| Peripheral PTA <sup>3</sup>                                | 81            |            |               | 1         | 17             | 45        |
| Renal PTA  | 5             |            |               | 0         | 4              | 12        |
| Carotid PTA  | 24            |            |               | 0         | 35             | 18        |
| Total nr. of stents in peripheral PTA                      | 76            |            |               | 1         | 9              | 50        |
| Peripheral angiography                                     | 500           |            |               | 60        | 841            | 50        |
| <b>Other interventions</b>                                 |               |            |               |           |                |           |
| TAVI   | 4             |            |               | 0         | 0              | 0         |
| MitraClip  | 0             |            |               | 0         | 0              | 0         |
| Aortic endoprosthesis                                      | 10            |            |               | 0         | 1              | 0         |
| Interventions in structural heart disease <sup>4</sup>     | 20            |            |               | 0         | 0              | 2         |
| <b>MACE</b>  |               |            |               |           |                |           |
| Death  | 32            |            |               | 0         | 72             | 0         |
| Periprocedural AMI   | 8             |            |               | 0         | 4              | 0         |
| Stroke   | 4             |            |               | 0         | 10             | 0         |
| Stent Thrombosis   | 4             |            |               | 0         | 3              | 0         |
| Major bleeding <sup>5</sup>                                | 4             |            |               | 0         | 3              | 0         |
| Coronary rupture   | 4             |            |               | 0         | 3              | 2         |

Table 1. continued

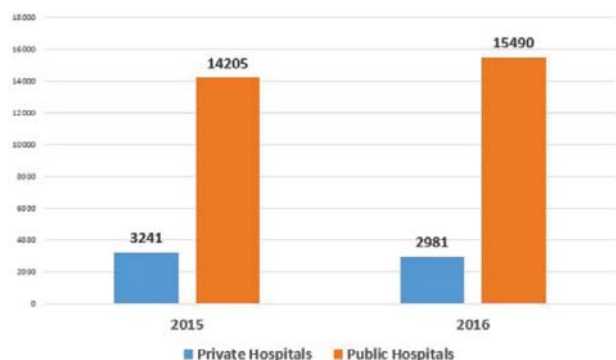
| City   | Braşov      |              | Oradea       |            | Arad         | Suceava    |
|--|-------------|--------------|--------------|------------|--------------|------------|
| Hospital   | Clinicco    | Sp. Judeţean | Sp. Judeţean | Cardiolife | Med New Life |            |
| Nr. of Cathlabs  | 1           | 2            | 2            | 1          |              | 2          |
| Nr. independent operators  | 2           | 3            | 4            | 1          |              | 2          |
| Nr. of in training operators                                     | 0           | 0            | 0            | 0          |              | 0          |
| <b>Total number of procedures (diagnostic + PCI)<sup>1</sup></b> | <b>2229</b> | <b>2236</b>  | <b>1802</b>  | <b>786</b> |              | <b>703</b> |
| <b>Coronary Interventions</b>                                    |             |              |              |            |              |            |
| Coronarography   | 1988        | 1336         | 1741         | 578        |              | 303        |
| Total nr. of PCI   | 527         | 702          | 744          | 169        |              | 258        |
| PCI without stents   | 17          | 71           | 42           | 0          |              | 16         |
| PCI with stents  | 510         | 631          | 702          | 164        |              | 242        |
| STEMI  | 14          | 408          | 328          | 48         |              | 290        |
| Stents per patient <sup>2</sup>                                  | 1.5         | 1.4          | 1.39         | 1.8        |              | 1.25       |
| Total nr. of stents  | 793         | 904          | 1035         | 305        |              | 304        |
| Nr. of DES   | 722         | 837          | 565          | 254        |              | 162        |
| DES/stents ratio (%)   | 91          | 92.6         | 54.6         | 83.3       |              | 53.3       |
| BVS  | 35          | 9            | 0            | 0          |              | 0          |
| Cutting, Scoring   | 0           | 2            | 1            | 0          |              | 0          |
| Rotablation  | 0           | 0            | 0            | 0          |              | 0          |
| FFR/IFR  | 2           | 2            | 0            | 0          |              | 0          |
| IVUS   | 0           | 0            | 0            | 0          |              | 0          |
| OCT  | 0           | 1            | 10           | 0          |              | 0          |
| <b>Peripheral interventions</b>                                  |             |              |              |            |              |            |
| Peripheral PTA <sup>3</sup>                                      | 11          | 1            | 7            | 41         |              | 117        |
| Renal PTA  | 0           | 0            | 0            | 4          |              | 1          |
| Carotid PTA  | 3           | 5            | 0            | 5          |              | 9          |
| Total nr. of stents in peripheral PTA                            | 13          | 0            | 0            | 35         |              | 59         |
| Peripheral angiography   | 30          | 9            | 236          | 75         |              | 25         |
| <b>Other interventions</b>                                       |             |              |              |            |              |            |
| TAVI   | 0           | 0            | 0            | 0          |              | 0          |
| MitraClip  | 0           | 0            | 0            | 0          |              | 0          |
| Aortic endoprosthesis  | 0           | 0            | 0            | 0          |              | 0          |
| Interventions in structural heart disease <sup>4</sup>           | 0           | 0            | 0            | 0          |              | 0          |
| <b>MACE</b>  |             |              |              |            |              |            |
| Death  | 0           | 16           | 6            | 3          |              | 20         |
| Periprocedural AMI   | 0           | 10           | 4            | 0          |              | 0          |
| Stroke   | 0           | 2            | 0            | 0          |              | 1          |
| Stent Thrombosis   | 1           | 5            | 3            | 0          |              | 2          |
| Major bleeding <sup>5</sup>                                      | 0           | 0            | 0            | 0          |              | 0          |
| Coronary rupture   | 0           | 0            | 2            | 0          |              | 0          |

Table 1. continued

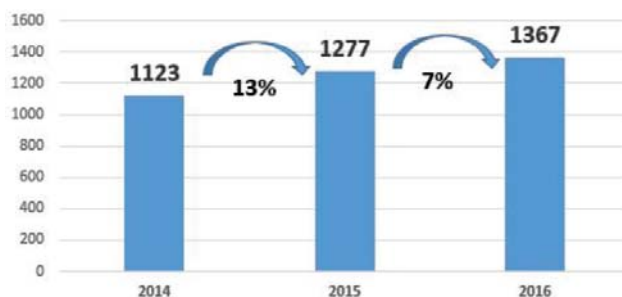
| City   | Baia Mare    | Sibiu       | Constanța   | Ploiești    | Pitești    |
|--|--------------|-------------|-------------|-------------|------------|
| Hospital   | Sp. Județean | Polisano    | Cardiolife  | Ploiești    | Pitești    |
| Nr. of Cathlabs  | 2            | 1           | 1           | 1           | 1          |
| Nr. independent operators  | 2            | 2           | 1           | 2           | 3          |
| Nr. of in training operators                                     | 0            | 0           | 0           | 0           | 0          |
| <b>Total number of procedures (diagnostic + PCI)<sup>1</sup></b> | <b>1181</b>  | <b>1256</b> | <b>1133</b> | <b>1017</b> | <b>976</b> |
| <b>Coronary Interventions</b>                                    |              |             |             |             |            |
| Coronarography   | 820          | 1087        | 780         | 759         | 573        |
| <b>Total nr. of PCI</b>  | <b>561</b>   | <b>445</b>  | <b>346</b>  | <b>365</b>  | <b>259</b> |
| PCI without stents   | 36           | 25          | 2           | 26          | 16         |
| PCI with stents  | 525          | 420         | 344         | 339         | 243        |
| STEMI  | 309          | 25          | 158         | 184         | 32         |
| Stents per patient <sup>2</sup>                                  | 1.6          | 1.6         | 1.33        | 1.22        | 1.25       |
| Total nr. of stents  | 677          | 721         | 459         | 447         | 305        |
| Nr. of DES   | 245          | 391         | 247         | 248         | 119        |
| DES/stents ratio (%)   | 36.2         | 54.2        | 53.8        | 55.5        | 39         |
| BVS  | 0            | 0           | 0           | 0           | 0          |
| Cutting, Scoring   | 6            | 25          | 0           | 0           | 5          |
| Rotablation  | 0            | 0           | 0           | 0           | 0          |
| FFR/IFR  | 0            | 20          | 0           | 0           | 0          |
| IVUS   | 0            | 0           | 0           | 0           | 0          |
| OCT  | 0            | 0           | 0           | 0           | 0          |
| <b>Peripheral interventions</b>                                  |              |             |             |             |            |
| Peripheral PTA <sup>3</sup>                                      | 27           | 16          | 2           | 32          | 62         |
| Renal PTA  | 0            | 1           | 0           | 0           | 3          |
| Carotid PTA  | 0            | 1           | 2           | 0           | 0          |
| Total nr. of stents in peripheral PTA                            | 13           | 25          | 3           | 1           | 27         |
| Peripheral angiography   | 208          | 46          | 3           | 221         | 191        |
| <b>Other interventions</b>                                       |              |             |             |             |            |
| TAVI   | 0            | 2           | 0           | 0           | 0          |
| MitraClip  | 0            | 0           | 0           | 0           | 0          |
| Aortic endoprosthesis  | 0            | 14          | 0           | 0           | 0          |
| Interventions in structural heart disease <sup>4</sup>           | 0            | 7           | 0           | 0           | 0          |
| <b>MACE</b>  |              |             |             |             |            |
| Death  | 20           | 1           | 12          | 2           | 1          |
| Periprocedural AMI   | 1            | 2           | 5           | 1           | 3          |
| Stroke   | 0            | 0           | 0           | 1           | 0          |
| Stent Thrombosis   | 1            | 1           | 2           | 1           | 1          |
| Major bleeding <sup>5</sup>                                      | 0            | 0           | 2           | 0           | 4          |
| Coronary rupture   | 0            | 1           | 1           | 0           | 0          |

1. All procedures performed in the intervention center; both diagnostic and therapeutic, coronary and peripheral, will be introduced. If in the same procedure the patient is diagnosed with coronary angiogram followed by angioplasty, it will be described as a procedure. If a patient performs coronary angiogram, and in a subsequent session will perform angioplasty, two procedures will be considered.
2. It will represent the ratio between the total number of implanted stents and the total number of patients undergoing PCI
3. Number of peripheral angioplasty (lower and upper limbs artery, not including carotid arteries)
4. Interventions in cardiac structural diseases: percutaneous closures of DSA, DSV, PFO, arterial duct, balloon valvulotomies, left atrial appendage closure
5. Major bleeding: fatal bleeding, intracranial hemorrhage, bleeding with hypovolemic shock (SBP <90 mmHg), hemoglobin decreased by >3 g/dl

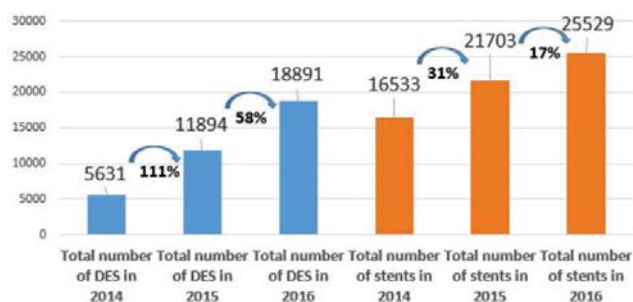




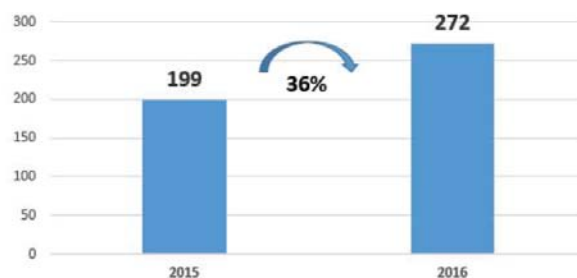
**Figure 4.** Total number of PCIs in 2015 and 2016 in private vs public hospitals in Romania.



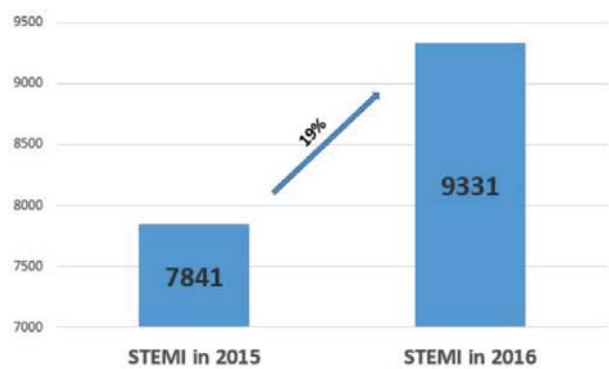
**Figure 8.** Total number of peripheral angioplasty in 2014-2016 in Romania (only in interventional cardiology centers).



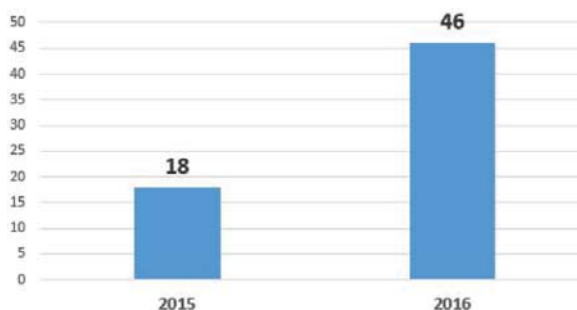
**Figure 5.** Total number of stents implanted in 2014-2016 in Romania.



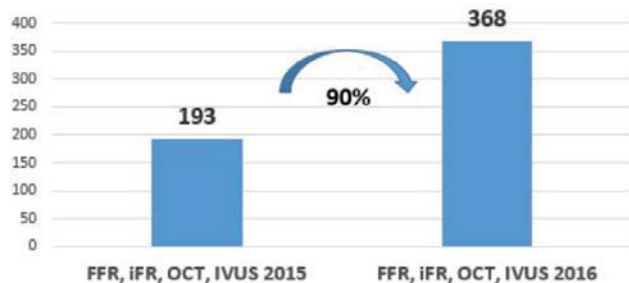
**Figure 9.** Total number of carotid angioplasty in 2015 vs 2016 in Romania (only in interventional cardiology centers).



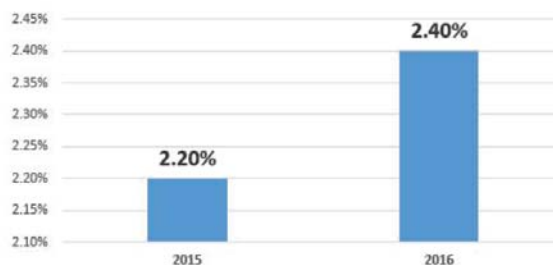
**Figure 6.** Total number of STEMI in 2015 vs 2016 in interventional centers from Romania.



**Figure 10.** ITAVI in 2015 vs 2016 in Romania.



**Figure 7.** Imaging and invasive coronary hemodynamics testing.



**Figure 11.** Mortality rate during PCI in 2015 vs 2016 in Romania.

were made 18471 coronary interventions. The total number of coronary angiogram in 2016 (42785) increased with 23% compared to total number of coronary angiogram in 2015 (34624).

We see the same trend in the total number of implanted stents (Figure 5). An important thing is that the total number of drug eluting stent implanted in 2015 increasing more than two folds compared with 2014. The same trend was found in 2016. The number of implanted stents per patient in 2016 was 1.46.

The total number of STEMI increased by 20% in 2016 compared to 2015 (Figure 6), which is probably due to the greater accessibility to the catheterization centers, the foundation of new catheterization centers that entered the STEMI program, and the clinical cardiologists are more familiar with this national program.

A very good finding is that the utilization of intracoronary imaging like OCT and IVUS and the utilization of invasive coronary hemodynamic measurements like IFR and FFR increased in 2016 with 90% compared to 2015 (Figure 7).

The total number of peripheral angioplasty slightly increased from 2014 to 2016, so the activity in this field is somehow unchanged; but we don't have the data from interventional radiologists (Figure 8). Maybe we need more interventional radiologist and interventional cardiologist dedicated to this field. However, the total number of carotid angioplasty in 2016 increased with 36% compared to 2015, which is a great progress (Figure 9).

In 2016 an important progress was achieved in what concerns other types of procedures, like TAVI (in 2016 were implanted percutaneous 46 aortic valves compared to only 18 in 2015) (Figure 10), mitralclip (were reported 3 cases) and aortic endoprosthesis (were reported 57 cases).

Regarding outcomes, the mortality rate during PCI in unselected patients in 2015 was 2.2% and it had a slight increase in 2016 to 2.4% (Figure 11).

There is a continuous need of implementing a *Mandatory Interventional Cardiology National Registry*, capable of monitoring objectively these key health care services in a standard manner. This national registry can guide further development of the interventional cardiology in Romania.

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