# In-Hospital Outcomes of Primary Percutaneous Coronary Intervention in King Chulalongkorn Memorial Hospital: 11 Years of Experience

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***Background:*** *Primary percutaneous coronary intervention (PCI) appears to be the preferred reperfusion method for patients with ST-segment elevation myocardial infarction(STEMI). This method was introduced in our hospital before the year 2000. In Thailand, data showing long experience results in patients with STEMI who underwent primary percutaneous coronary intervention remain limited.*

***Objective:*** *To demonstrate 11-yr experience of primary percutaneous coronary intervention at King Chulalongkorn Memorial Hospital.*

***Material and Method:*** *This retrospective descriptive single-center study analyses clinical characteristics, angiographic features and in-hospital outcomes of 772 patients with STEMI who underwent primary percutaneous coronary intervention between 2000 and 2010.*

***Results:*** *Seven hundred seventy two consecutive patients with STEMI were enrolled in the study. Three-fourth of the patients were male. Mean age was 60.13 years (range 28 to 96 years) and 12.6% were older than 75 years old. Forty-eight percent of patients were referred from hospital without cardiac catheterization facilities. Of these patients 94.4% underwent primary PCI and rescue PCI was done in 5.6% of patients. There were 27% of patients with left ventricular ejection fraction less than 40%, 21% of patients with Killip's class IV, and 12% suffered cardiac arrest prior to angiography. Median door-to-balloon time in referred and non-referred patients was 28 and 104.5 minutes, respectively. Ninety-two percent of referred patients and 36% of non-referred patients, door to balloon time were within 90 minutes. About half of the patients had multi-vessels disease at that time of diagnosis. The overall angiographic success rate was 96%. Platelet glycoprotein llb/llla inhibitors were used in two-third of patients and stent placement in 82%. Post procedural Thrombolysis In Myocardial Infarction (TIMI) 3 flow was documented in 87%. Intra-aortic balloon pump was used in 15% and thrombus aspiration device in 47%. During hospital stay, in-hospital mortality was 8.5% and 80% of those cases died from cardiac cause. One-third of patients died if they had Killip's class IV at presentation compared with 1.6% in patients with Killip's class I-III. In-hospital major adverse cardiovascular event was 10.4%.*

***Conclusion:*** *During 11 years of primary PCI experience in King Chulalongkorn Memorial Hospital, the angiographic success rate was high with acceptable in-hospital mortality and major adverse cardiac event. This strategy of treatment should be the treatment of choice for patients with STEMI in experienced PCI capable center with 24 hours/7 days availability.*

***Keywords:*** *Primary percutaneous coronary intervention, ST-segment elevation myocardial infarction, Door to balloon time*

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Primary percutaneous coronary intervention (PCI) has become the emerging acute reperfusion method in the Western world or some of the Asian countries. It is currently viewed as the standard of care for patients with acute ST-elevation myocardial infarction (STEMI) at centers with both interventional facilities and experience[1-5]. At King Chulalongkorn Memorial Hospital, the authors have established a fast track policy since June 1999. In Thailand, data showing long experience results in patients with STEMI who underwent primary percutaneous coronary intervention remain limited. For that reason, the authors analyzed

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results of patients with STEMI, who underwent primary PCI at our hospital during the 11-year period.

## Material and Method

### *Study population*

This retrospective descriptive single-center study analysis of clinical characteristics, angiographic features and in-hospital outcomes of 772 patients with STEMI who underwent primary PCIs or other indications *e.g.*, rescue, facilitated PCI at the King Chulalongkorn Memorial Hospital between January 2000 and December 2010. Submission for urgent coronary angiography and PCI was based on the decision of our attending interventional cardiologists. All patients were pre-treated with aspirin, ticlopidine or clopidogrel, and heparin. However, certain technical aspects (clopidogrel dose, isolated balloon angioplasty without stent, choice and implantation of stents, thrombus aspiration, and use of glycoprotein IIb/IIIa inhibitors, or intra-aortic balloon pump [IABP]) were decided on case-by-case based on the availability of device and operator. Stenting of the target lesion was performed using standard interventional techniques. After the primary PCI, all patients were treated with medications according to the guidelines including clopidogrel, statins, β-blockers and angiotensin converting enzyme inhibitor/angiotensin receptor blocker. The study was approved by Institutional Review Board, Faculty of Medicine, Chulalongkorn University.

### *Definitions and data analysis*

ST-elevation myocardial infarction was made in patients with the presence of chest pain lasting for at least 20 minutes with > 1 mm ST-segment elevation in at least two contiguous leads or typical chest pain together with new or presumed-new left bundle branch block. For diagnosis of posterior wall based on the EKG criteria of ST segment depression in anterior chest lead plus wall motion abnormal using imaging modality. Total time to reperfusion was defined as time from the onset of chest pain to the first balloon inflation. Cardiogenic shock was defined as the presence of peripheral hypoperfusion signs (cold shivering, paleness, oliguria, or loss of consciousness etc.) accompanied by sustained systolic blood pressure of < 90 mmHg after fluid administration or required inotropic therapy and/or intra-aortic balloon pump. Multivessel disease was defined as the presence of at least 70% stenosis of a major epicardial vessel or at least 50% stenosis of the left main involving two or more major epicardial coronary arteries. Missing time data included exact door time in referred patients that could be arrival times at the non-PCI hospital (first hospital door time), PCI hospital arrival times, or catheterization laboratory arrival times. Therefore, door-to-balloon time data was available and represented only in the non-referred patients who presented directly to PCI center's ER. Angiographic success was defined as a residual stenosis of < 30% with restoration of TIMI 2-3 flow. Procedural success was defined as angiographic success without in-hospital major adverse cardiac events (MACE) including death, re-infarction, or stroke. Re-infarction was defined as recurrence of pain or new-onset ECG alterations accompanied by new elevation of CK-MB or troponin T. Stroke was determined as any new neurological deficit lasting > 24 hours. Major bleeding/hematoma was defined as the bleeding or hematoma > 10 cm for femoral access or > 5 cm for brachial access or > 2 cm for radial access or the bleeding should require a transfusion and/or cause a drop in hemoglobin > 3.0 gm/dl and/or require prolong the hospital stay.

### *Statistical analysis*

Continuous data were presented as mean ± standard deviation and compared using the Student's t test. Categorical data were presented as percentages and compared using the chi-square or Fisher's exact test when appropriate. In order to determine the factors for in-hospital mortality, Log-rank test was used for univariate analysis and Cox proportional hazard with backward elimination was used for multivariate analysis. P-values less than 0.05 was considered statistically significant. Data processing and statistical analysis were performed using SPSS version 13 (SPSS Inc., Chicago, Illinois, USA) software.

## Results

Primary PCIs in 772 STEMI patients was performed during the study period. The number of primary PCIs has grown steadily, and has stabilized at around 70 to 90 cases/year in the last three years as shown in Fig. 1. The mean and median age was 60 ± 13 and 60 years, respectively (range 28 to 96) and 73.8% were male. One-third of patients were diabetes. Nearly two-third of the patients were in Killip Class I on presentation with 20.7% presenting with cardiogenic shock (Killip Class IV) and 11.6% suffered cardiac arrest prior to angiography. PCI were also performed for thrombolysis failure (rescue PCI) in 5.6%. Other

baseline demographic and clinical characteristics of the patients were listed in Table 1. The median time between symptoms onset and first medical contact (which available since 2009) was 120 (IQR; 60, 248) minutes and most patients presented within four hours after the onset of symptoms (Fig. 2). The median door-to-balloon time was 63 minutes for the whole group. For the referred and non-referred group were 28 and 104.5 minutes, respectively. In non-referred group, door-to-balloon time between office and non-office hour was not different after 2006 and can achieve median door-to-balloon time to less than 100 minutes (Fig. 3). Time delay from the first medical contact to the first balloon inflation was shortest in patients admitted to the catheterization laboratory directly from the referring non-PCI hospital as shown in Table 2.

The patients' angiographic and procedural characteristics are summarized In Table 3. The infarct-related artery was left anterior descending in 52.1% and left main coronary in 0.8%. Multivessel disease was presented in 52.2%. Initial TIMI III flow was seen in 10.6%. Glycoprotein IIb/IIIa inhibitors was administered to 65.3%. Stent implantation was performed in 82.2%, mostly bare metal stent. Thrombo-aspiration device and intra-aortic balloon pump were

**Table 1.** Baseline clinical characteristics (n = 772)

| Variable | |
|---|---|
| Mean age ± SD (yrs) | 60 ± 13 |
| Gender: male (%) | 73.8 |
| Hypertension (%) | 51.5 |
| Diabetes (%) | 33.7 |
| Hyperlipidemia (%) | 72.6 |
| Smoking (%) | 52.2 |
| Family history of CAD (%) | 8.3 |
| Previous MI (%) | 7.6 |
| Resuscitated cardiac arrest (%) | 11.6 |
| Killip's class on admission | |
| I | 63.6 |
| II | 9.8 |
| III | 5.8 |
| IV | 20.7 |
| Cardiogenic shock (%) | 21.0 |
| Anterior wall infarction (%) | 52.8 |
| LV ejection fraction < 40 (%) | 26.7 |
| Referring non-PCI hospitals' patients (%) | 48.4 |
| Rescue PCI (%) | 5.6 |
| Non-office hour PCI (%) | 40.5 |

SD = standard deviation; CAD = coronary artery disease; MI = myocardial infarction; LV = left ventricle; PCI = percutaneous coronary intervention

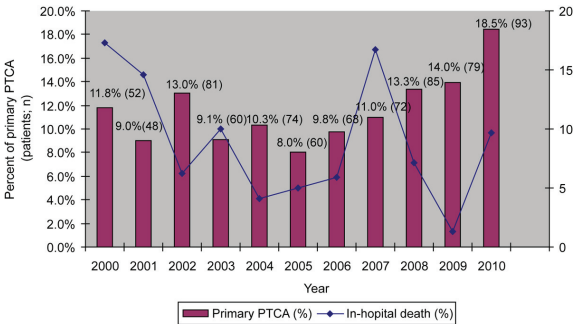


**Fig. 1** Demonstrate of percent of primary PCI to total number of PCI and In-hospital mortality for primary PCI performed at King Chulalongkorn Memorial Hospital from 2000-2010

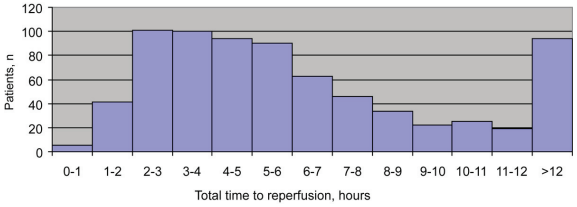


**Fig. 2** Distribution of total time to reperfusion(onset of symptoms to first balloon inflation) in consecutive patients with acute STEMI admitted to our hospital who underwent primary PCI from 2000 to 2010

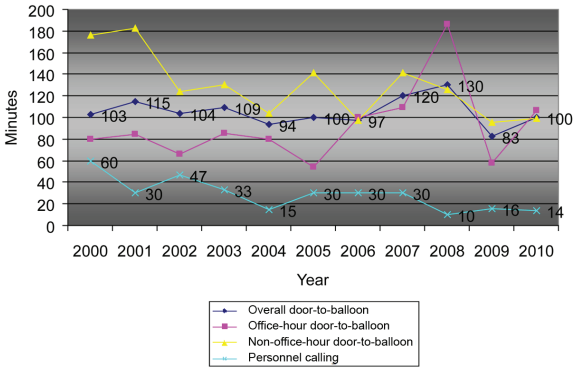


**Fig. 3** Median door-to-balloon time in non-referred patients according to office (8 AM to 4 PM) and non-office hour (4.01 PM to 7.59 AM) and median personnel calling time at King Chulalongkorn Memorial Hospital

**Table 2.** Time delays (minutes) from the onset of symptoms to first balloon inflation in patients admitted through our emergency department vs. referring non-PCI hospitals

| Time duration (minutes) | Our Emergency Department (non-referred patients) median ($25^{th}$, $75^{th}$ percentiles) | Referring non-PCI Hospital (referred patients) median ($25^{th}$, $75^{th}$ percentiles) |
|---|---|---|
| Total ischemic* | 272 (172, 444.5) | 329 (240, 531) |
| Pre-hospital** | 124 (60, 256) | 120 (60, 211) |
| Inter-hospital*** | - | 170 (102, 270) |
| Door-to-balloon | 104.5 (76.3, 147.8) | 28 (20, 40) |
| Door-to-balloon ≤ 90 minutes (%) | 36.4 | 92.1 |

* Onset of symptoms to first balloon inflation
** Onset of symptoms to first medical contact
*** Door of first medical contact or non-PCI hospital to cath lab of PCI hospital

**Table 3.** Angiographic and procedural findings (n = 772)

| Variable | |
|---|---|
| Culprit vessel (%) | |
| LAD | 52.1 |
| RCA | 39.6 |
| LCX | 7.1 |
| LM | 0.8 |
| SVG/LIMA | 0.3/0.1 |
| Multivessel disease (%) | 52.2 |
| Initial TIMI flow grade (%) | |
| 0-1 | 78.8 |
| 2 | 10.6 |
| 3 | 10.6 |
| Final TIMI flow grade (%) | |
| 0-1 | 3.8 |
| 2 | 9.1 |
| 3 | 87.2 |
| Stent used (%) | 82.2 |
| GP IIb/IIIa used (%) | 65.3 |
| Thromboaspiration device (%) | 46.8 |
| IABP (%) | 15.0 |

LAD = left anterior descending artery; RCA = right coronary artery; LCX = left circumflex artery; LM = left main; SVG = sapheneous vein graft; LIMA = left internal mamillary artery; TIMI = thrombolysis in myocardial infarction; GP IIb/IIIa = glycoprotein IIb/IIIa; IABP = intra-aortic balloon pump

**Table 4.** Procedural results, in-hospital events and performance measures

| Variable | Values |
|---|---|
| Door-to-balloon time* (minutes) | 63 (27, 112) |
| Angiographic PCI success (%) | 96.1 |
| Emergency or urgency CABG (%) | 2.0 |
| Median length of stay* (days) | 4 (3, 7) |
| In-hospital mortality (%) | 8.5 |
| Without cardiogenic shock (%) | 1.6 |
| With cardiogenic shock (%) | 33.3 |
| Referred patients (%) | 8.9 |
| Non-referred patients (%) | 8.0 |
| Re-infarction (%) | 1.8 |
| Stroke (%) | 0.4 |
| MACE** (%) | 10.1 |
| Procedural success*** (%) | 87.9 |

PCI = percutaneous coronary intervention; CABG = coronary artery bypass grafting; MACE = major adverse cardiac event
* Values expressed as median ($25^{th}$, $75^{th}$ percentiles)
** MACE: major adverse cardiac event including in-hospital death, re-infarction, stroke
*** Procedural success; angiographic success without in-hospital major adverse cardiac event (MACE)

used in 46.8% and 15%, respectively. The angiographic success was achieved in a high percentage of patients (96.1%) (Table 4). In-hospital death was observed in 66 patients (8.5%) and 80% of those cases died from cardiac cause. In-hospital mortality for cardiogenic shock was 33.3% and for non-cardiogenic shock was 1.6%. Re-infarction was observed in 13 patients (1.7%). Stroke and major bleeding/hematoma were observed in three (0.4%) and six patients (0.8%), respectively. In-hospital major adverse cardiac event

**Table 5.** In-hospital mortality according to the presence of risk factors

| Risk factor | King Chulalongkorn Memorial Hospital | Randomized Trials[2,9,11,13] | Registries[14-16] |
|---|---|---|---|
| In-hospital mortality (%) | 8.5 | 2-7 | 3-9 |
| With cardiogenic shock | 33.3 | 15-46 | 15-60 |
| Without cardiogenic shock | 1.6 | 2-5 | 3-9 |
| Age > 75 years | 17.7 | N/D | 14-25 |
| Unsuccessful PCI | 40.0 | N/D | 3-70 |
| Multivessel disease | 11.8 | 0-6 | 9-13 |

PCI = percutaneous coronary intervention

**Table 6.** Univariate analysis of factors that effect survival time

| Characteristic | Crude hazard ratio (95% CI) | p-value |
|---|---|---|
| Dyslipidemia | 0.51 (0.29-0.92) | 0.023 |
| Smoking | 0.45 (0.26-0.78) | 0.004 |
| Age > 75 years | 2.80 (1.54-5.10) | 0.000 |
| Female | 2.48 (1.47-4.15) | 0.000 |
| Resuscitated cardiac arrest prior to hospital | 4.27 (2.38-7.69) | 0.000 |
| LVEF < 40 | 6.56 (3.46-12.42) | 0.000 |
| Unsuccessful PCI | 8.62 (3.94-18.84) | 0.000 |
| IABP usage | 20.41 (11.49-37.04) | 0.000 |
| Cardiogenic shock | 31.25 (15.38-62.50) | 0.000 |

LVEF = left ventricular ejection fraction; IABP = intraaortic balloon pump

**Table 7.** Multivariate analysis of factors that effect survival time

| Characteristic | Adjusted hazard ratio (95% CI) | p-value |
|---|---|---|
| Cardiogenic shock | 3.33 (1.04-10.69) | 0.043 |
| LVEF < 40 | 2.46 (1.14-5.29) | 0.021 |
| DM | 0.47 (0.21-1.04) | 0.063 |
| HT | 3.87 (1.66-9.05) | 0.002 |
| Smoking | 0.50 (0.24-1.05) | 0.067 |
| Dyslipidemia | 0.49 (0.24-1.01) | 0.052 |

LVEF = left ventricular ejection fraction; DM = diabetes mellitus; HT = hypertension

including in-hospital death, re-infarction, or stroke was 10.1%. The median length of hospital stay was four (IQR; 3, 7) days. In-hospital mortality according to the presence of risk factors was comparable with the other published results from large international registries and multicenter trials (Table 5). The univariate analysis for in-hospital mortality showed that female, age > 75 years, smoking, dyslipidemia, resuscitated cardiac arrest prior to hospital, LVEF < 40%, multivessel disease, IABP usage, unsuccessful PCI and cardiogenic shock were the significant predictors (Table 6). When using multivariate analyses by Cox proportional hazard, hypertension, LVEF < 40%, and cardiogenic shock were the only predictors for in-hospital mortality (Table 7).

## Discussion

In this retrospective study, the authors aimed to present the results of primary PCI performed during an 11-year period in a high-volume tertiary center with the introduction of primary PCI in unselected patients with STEMI, including those with resuscitated cardiac arrest (11.6%) and cardiogenic shock (20.7%) on admission. One of the aims of the present study was to assess the quality and safety of primary PCI in our hospital, a high-volume reference center, comparing it with published results from large international registries and multicenter clinical trials[2,6-11,13-16]. Our short-term results of primary PCI for STEMI patients in our hospital are comparable. In-hospital mortality of patients with cardiogenic shock was significantly

higher. A similar phenomenon was shown in patients with Killip's Class IV[12]. Angiographic success rates of between 85% and 97% have been reported in the literature[9,11]. Angiographic success in our registry was 96.1%, which is comparable. Our hospital is one of the high volume tertiary centers in Thailand with 24 hours/7 days PCI facility and experienced interventional cardiology staffs. Our center performs approximately 500 to 700 PCI procedures per year. One of the five on-call cardiologists for emergent PCI becomes the attending physician for the STEMI patient on whom they have performed PCI. In referring non-PCI hospitals' patients, they should be admitted directly to the catheterization laboratory bypassing the emergency room or intensive care unit. Therefore, door-to balloon time was the door of our hospital's catheterization laboratory in referring non-PCI hospitals' patients, or our emergency department in non-referred patients to first balloon inflation, respectively. In non-referred patients, our median door-to-balloon time of 104.5 minutes did not meet the 90 minutes target set by the ACC/AHA[13]. In fact, a survey by Bradley et al[14] of 365 hospitals in the US providing primary PCI service showed that only 35.1% of hospitals met the median door-to-balloon target of 90 minutes and 47.8% had timings between 91 to 120 minutes.

There are several limitations to the present study. The major one is that the present study design is a retrospective observational analysis for our single-center experience that involves only a small number of patients. Since not all STEMI patients can always present at high-volume centers that comply with the guideline[15]. Therefore, the results we have may not be very typically compared with those obtained from a multi-center study. Moreover, the lack of more accurate quantitative angiographic data, measurements of microvascular reperfusion after primary PCI, and in particular, lack of clinical long- term follow-up. Finally, it is preferable that the study be designed so that the patients are treated according to the independent initiative of the attending cardiologist that one of technique may be different and influence on the outcomes[16].

In conclusion, in our center, primary PCI outcomes of STEMI patients is effective and safe with high overall success rate and acceptable in-hospital mortality and major adverse cardiac events.

**Potential conflicts of interest**

None.

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# การศึกษาผลการรักษาขณะที่อยู่ในโรงพยาบาลในผู้ป่วยกล้ามเนื้อหัวใจตายเฉียบพลันด้วยการทำบอลลูนขยายหลอดเลือดในช่วง 11 ปีที่ผ่านมาในโรงพยาบาลจุฬาลงกรณ์

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***ภูมิหลัง:*** *ปัจจุบันการรักษาโดยการทำบอลลูนขยายหลอดเลือดถือเป็นการรักษามาตรฐานในผู้ป่วยที่มีภาวะกล้ามเนื้อหัวใจตายเฉียบพลัน และในโรงพยาบาลจุฬาลงกรณ์ได้เริ่มมีการทำหัตถการดังกล่าวตั้งแต่ก่อนปี พ.ศ. 2543 ในประเทศไทยจากข้อมูลหรือรายงานที่แสดงถึงผลการรักษาในกลุ่มผู้ป่วยดังกล่าวพบว่าสามารถทำได้และได้ผลดี แม้ในปัจจุบันข้อมูลหรือรายงานที่รวบรวมผลการรักษาในช่วงระยะเวลามากกว่า 10 ปี จะยังมีจำกัดอยู่*

***วัตถุประสงค์:*** *เพื่อเป็นการศึกษาถึงผลการรักษาขณะที่อยู่ในโรงพยาบาลในผู้ป่วยกล้ามเนื้อหัวใจตายเฉียบพลันด้วยการทำบอลลูนขยายหลอดเลือดในโรงพยาบาลจุฬาลงกรณ์ในช่วง 11 ปีที่ผ่านมา*

***วัสดุและวิธีการ:*** *เป็นการศึกษากลุ่มผู้ป่วยกล้ามเนื้อหัวใจตายเฉียบพลันชนิด ST segment ยกที่ได้รับการรักษาด้วยการทำบอลลูนขยายหลอดเลือด จำนวน 772 ราย ในโรงพยาบาลจุฬาลงกรณ์ตั้งแต่ 1 มกราคม พ.ศ. 2543 ถึง 31 ธันวาคม พ.ศ. 2553 ผลที่ได้จะดูถึงอัตราการเสียชีวิต อัตราการเกิดกล้ามเนื้อหัวใจตายซ้ำและอัตราการเกิดโรคหลอดเลือดสมองขณะอยู่ในโรงพยาบาล*

***ผลการศึกษา:*** *ในผู้ป่วยจำนวน 772 ราย ที่เป็นกล้ามเนื้อหัวใจตายเฉียบพลันชนิด ST segment ยก พบว่าเป็นเพศชาย 73.8 เปอร์เซ็นต์ ผู้ป่วยมีอายุเฉลี่ย 60 $\pm$ 13 ปี โดยผู้ป่วย 12.6 เปอร์เซ็นต์ มีอายุเกินกว่า 75 ปี ผู้ป่วยเกือบครึ่งหนึ่งถูกส่งต่อมาจากโรงพยาบาลอื่น ผู้ป่วย 94.4 เปอร์เซ็นต์ ได้รับการเปิดหลอดเลือดโดยการทำบอลลูนขยายแบบ primary PCI และ 5.6 เปอร์เซ็นต์ ได้รับการทำบอลลูนขยายแบบ rescue angioplasty ผู้ป่วย 27 เปอร์เซ็นต์มีการบีบตัวของหัวใจห้องล่างซ้ายน้อยกว่า 40 เปอร์เซ็นต์ ผู้ป่วย 21 เปอร์เซ็นต์มีภาวะช็อกจากหัวใจ และ 12 เปอร์เซ็นต์ มีภาวะหัวใจหยุดเต้นก่อนมาถึงโรงพยาบาล ค่ากลางของระยะเวลา door-to-balloon เท่ากับ 28 นาที และ 92 เปอร์เซ็นต์ มีค่ากลางของระยะเวลา door-to-balloon น้อยกว่า 90 นาที ในกลุ่มผู้ป่วยที่ถูกส่งต่อมาจากโรงพยาบาลอื่น และในกลุ่มผู้ป่วยที่ไม่ได้ถูกส่งต่อมีค่ากลางของระยะเวลา door-to-balloon เท่ากับ 104.5 นาที และ 36 เปอร์เซ็นต์ มีค่ากลางของระยะเวลา door-to-balloon น้อยกว่า 90 นาที ครึ่งหนึ่งของผู้ป่วยพบภาวะเส้นเลือดหัวใจตีบหลายเส้นขณะที่ได้รับการฉีดสีวินิจฉัย ผู้ป่วย 2 ใน 3 ได้รับยา glycoprotein llb/lla inhibitors และได้รับขดลวดค้ำยัน 82 เปอร์เซ็นต์ อัตราการประสบความสำเร็จจากการฉีดสีหลังการรักษาเท่ากับ 96.1 เปอร์เซ็นต์ โดยพบว่า 87 เปอร์เซ็นต์ ของผู้ป่วยสามารถทำให้เลือดกลับมาไหลได้ตามปกติ (TIMI 3 flow) มีการใช้เครื่องมือ Intra-aortic balloon pump และ thromboaspiration ในผู้ป่วย 15 เปอร์เซ็นต์ และ 47 เปอร์เซ็นต์ ตามลำดับ ผู้ป่วยที่ได้รับการรักษามีอัตราการเสียชีวิตในโรงพยาบาล 8.5 เปอร์เซ็นต์ โดยพบว่าผู้ป่วยจะมีอัตราการเสียชีวิตถึง 1 ใน 3 ถ้าผู้ป่วยมีภาวะช็อกจากหัวใจร่วมด้วย อัตราการเกิด major adverse cardiac event (MACE) ในโรงพยาบาล 10.1 เปอร์เซ็นต์*

***สรุป:*** *การรักษาผู้ป่วยกล้ามเนื้อหัวใจตายเฉียบพลันที่ได้รับการรักษาด้วยการทำบอลลูนขยายหลอดเลือดในโรงพยาบาลจุฬาลงกรณ์ในช่วง 11 ปีที่ผ่านมา มีผลการรักษาขณะที่อยู่ในโรงพยาบาลอยู่ในระดับที่ดีและน่าพึงพอใจ*