

A CASE STUDY IN THE DEVELOPMENT OF FIBRINOLYTIC THERAPY IN A COMMUNITY HOSPITAL IN INDONESIA

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ABSTRACT

Coronary heart disease (CHD) is one of the leading causes of mortality in Indonesia aside from stroke. To reduce the mortality rate, a highly time-dependent, adequate therapy is needed for patients with electrocardiographic features of ST-Elevation Myocardial Infarction (STEMI). The gold standard for reperfusion therapy is thirty minutes for fibrinolytics and ninety minutes for primary PCI. For a community hospital, conducting the reperfusion therapy can be a challenge due to various factors, including human resources, standard operating procedures, and the infrastructure needed. However, to refer the patient to a tertiary hospital often requires time longer than ninety minutes. Therefore, community hospitals should be able to act as the front line of the healthcare system by facilitating fibrinolytic therapy to reduce the mortality rate of CHD in Indonesia. Development of fibrinolytics treatment in community hospitals can be done by creating an expert-reviewed SOP, providing competent human resources, and equipping the hospital with the necessary infrastructure for the service. These are all done in order to keep up with the "golden period" of STEMI patients with a thirty-minute door-to-needle timeframe and reduce the mortality rate caused by ACS in Indonesia.

Keywords: Community Hospital, CHD, STEMI, Fibrinolytics.

ABSTRAK

Penyakit jantung koroner (PJK) merupakan salah satu penyebab utama kematian di Indonesia selain stroke. Untuk mengurangi angka kematian, terapi yang sangat tergantung waktu dan memadai diperlukan untuk pasien dengan fitur elektrokardiografi ST-Elevation Myocardial Infarction (STEMI). Standar emas untuk terapi reperfusi adalah tiga puluh menit untuk fibrinolitik dan sembilan puluh menit untuk PCI primer. Untuk rumah sakit komunitas, melakukan terapi reperfusi dapat menjadi tantangan karena berbagai faktor, termasuk sumber daya manusia, prosedur operasi standar, dan infrastruktur yang dibutuhkan. Namun, untuk merujuk pasien ke rumah sakit tersier seringkali membutuhkan waktu lebih dari sembilan puluh menit. Oleh karena itu, rumah sakit komunitas harus mampu berperan sebagai garda terdepan dalam sistem pelayanan kesehatan dengan memfasilitasi terapi fibrinolitik untuk menurunkan angka kematian PJK di Indonesia. Pengembangan pengobatan fibrinolitik di rumah sakit komunitas dapat dilakukan dengan membuat SOP yang ditinjau oleh ahli, menyediakan sumber daya manusia yang kompeten, dan melengkapi rumah sakit

dengan infrastruktur yang diperlukan untuk pelayanan. Ini semua dilakukan untuk mengimbangi “masa emas” pasien STEMI dengan timeframe door-to-needle tiga puluh menit dan menekan angka kematian akibat SKA di Indonesia.

Kata Kunci: RS Komunitas, PJK, STEMI, Fibrinolitik.

INTRODUCTION

Coronary heart disease (CHD) is a condition caused by plaque buildup in the walls of the coronary arteries, leading to the arteries being narrowed or obstructed. Coronary arteries are vessels supplying oxygen-rich blood to cardiac muscle. There are several factors that precipitate this disease, including lifestyle, genetics, age, and other comorbidities¹. According to the WHO, in 2015, there were 7.4 million cases of death per year caused by coronary heart disease. Another study conducted in the US between 1988 and 1994 found that the incidence of stroke in women aged between 20 and 24 is 4.6%, but the number rises to 79% in the population over 75. For heart disease, the rate rose from 2.8% to 16.1%. With increasing age in men, the incidence of coronary heart disease decreases, whereas in women, the incidence of coronary heart disease increases with increasing age. For heart disease, the rate rose from 2.8% to 16.1%. With increasing age in men, the incidence of coronary heart disease decreases, whereas in women, the incidence of coronary heart disease increases with increasing age. A 2013 Riskesdas report showed that CHD is the seventh-highest non-infectious disease in Indonesia. More than 36 million people die per year due to non-infectious diseases in Indonesia, which makes up 63% of the overall mortality rate. The highest rate of coronary heart disease can be found in East Java province, which is 1.3% of the total population (375,127 patients), while the lowest rate is

found in West Papua province (6,690 patients)². Given the high mortality rate, one feasible effort to shorten the time to cardiac reperfusion can be done in community hospitals by developing a fibrinolytics treatment service for CHD STEMI.

LITERATURE REVIEW

Human Resources

A team needs to be prepared, consisting of cardiologists, emergency physicians, intensivists, on-shift doctors in the ED and the ICU, ED nurses, and ICU nurses. All personnel have complementary roles, which are necessary for building a strong team to develop the system and provide fibrinolytic treatment for the patients.⁷

The cardiologists are the leading doctor in charge and act as the decision maker for the patient's treatment. They are responsible for determining whether the patients should receive fibrinolytic treatment or be referred to a larger hospital for PCI. They also provide continuous treatment for STEMI patients admitted to the community hospital.

The emergency physicians have a supervising role and are responsible for ensuring that the door-to-needle system works well in the thirty-minute timeframe in the ED. They are also responsible for stabilizing the patients' condition if they arrive in a critical state (Killip III or IV), so the fibrinolytics treatment can be performed safely. If any complication or deterioration of the patient's condition occurs during the treatment in the ED, then the emergency physician should take

charge and resuscitate the patient. The emergency physician is also the secondary decision-maker on the fibrinolytic treatment if the cardiologists cannot respond in time.

During the patient's stay in the ICU, the intensivists serve as the supporting doctors in charge. STEMI patients will spend some time under strict observation in the ICU during their acute phase, so the intensivist is responsible for supervising and responding to any hemodynamic instability and other emergencies that might occur.

The roles of the general practitioners (GPs), the doctors on shift, and the nurses are also very important. They will be the ones responsible for performing the treatment and ensuring that the protocol is followed 24 hours a day. The doctors will get training and a workshop regarding CHD, ACS, and STEMI so they can recognize the typical chest pain related to ACS and correctly interpret a STEMI ECG. Then they consult the cardiologist or the emergency physician for approval of the treatment. The GPs also have to explain to the patient and the family about the advantage, the disadvantage, the objective, and the possible complications of the treatment and obtain informed consent while filling out the contraindication checklist form. After informed consent is obtained, the fibrinolytic treatment is performed. The GPs are responsible for leading early resuscitation and treatment efforts if complications occur, including bleeding, reperfusion arrhythmias⁹, and cardiac arrest, with the nurses assisting the efforts. The GPs and the nurses must be provided with adequate training (ACLS for doctors, minimum BTCLS for nurses) so they can handle complications and deteriorations of patients' conditions.

Infrastructure

In order to safely perform fibrinolytic treatment, a community hospital must have an adequate resuscitation room in the ED. The resuscitation room must be equipped with a patient monitor, complete sets of resuscitation tools, and even a ventilator for patients with sudden deterioration. Accurately calibrated infusion pumps are also necessary to help administer the drug to the patient within the exact timeframe needed. Lastly, the ED must have a fully equipped, standardized ambulance connected to the online referral system. If the patient requires primary PCI, he or she can then be safely transported to a larger hospital.¹⁰

An intensive care ward is also necessary to observe the patients during their acute phases. It has to be equipped with patient monitors for continuous monitoring of the patient's vital signs. A specialized cardiac intensive care unit will be the best option, but if there isn't one, then the general intensive care unit can be utilized to monitor the post-fibrinolytic patients.

METHODOLOGY

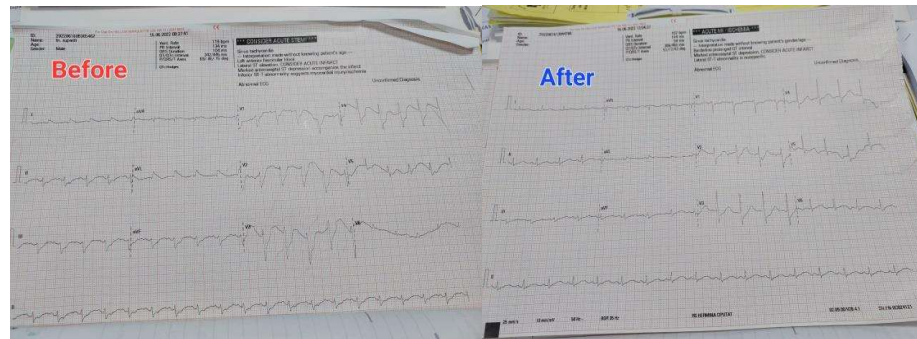
This case study describes the first time a fibrinolytic treatment was performed in a community hospital. A 47-year-old male came to the emergency department (ED) with crushing chest pain in the 3 hours before admission. His initial blood pressure was 70/40, his heart rate was 120 beats per minute, the Visual Analog Scale was 8, and his respiratory rate was 28 beats per minute. He was fully conscious, with an oxygen saturation of 95% on room air. An electrocardiograph (ECG) was taken, and it showed ST elevation on leads I and aVL with reciprocal changes on leads II, III, aVF, and V1-V4. The patient was resuscitated,

and inotropic drugs were administered. The fibrinolytic was prepared thirty minutes after the ECG confirmed STEMI. In accordance with the protocol, the drug used was streptokinase. The patient was observed during the administration of the drug, and a repeat ECG was taken an hour after the treatment

was finished. Repeat vital signs after fibrinolytics showed blood pressure of 110/70, a heart rate of 100 times per minute, a respiratory rate of twenty times per minute, and a VAS of 3. The patient was fully conscious, with an oxygen saturation of 97% on room air.

Initial ECG

1-Hour Post Fibrinolytic ECG



RESEARCH RESULT

A key factor in STEMI treatment is ischemic time (symptom onset), which is the time elapsed from the onset of the symptoms to reperfusion therapy. The ideal time for fibrinolytic administration is thirty minutes after onset (evidence level A). Treatment with fibrinolytics has been shown to prevent 30 short-term deaths per 1000 patients treated within six hours of symptom onset. According to ACCF/AHA (2013), fibrinolytics can be administered to patients within twelve hours after symptom onset, but the best results occur when the drug is given within three hours. Fibrinolytics show less benefit in patients presenting more than twelve hours after onset because the plaque has matured and is difficult to lyse. Each minute of reperfusion delay will result in more extensive necrosis and a poorer outcome. 3

Based on those data, community hospitals should be able

to perform reperfusion therapy for ACS-STEMI treatment. Referring STEMI patients to a larger hospital will cause a lot of delays, including waiting time, transfer time, and handover time in the referral hospital, which will take more than ninety minutes and lengthen the ischemic time.4 Treatment with fibrinolytics in community hospitals can reduce ischemic time and significantly lower the mortality rate for patients. However, to be able to perform fibrinolytics treatment, a healthcare facility needs to make a lot of preparations, including standards of service, human resources, and infrastructure.

Standards of Service

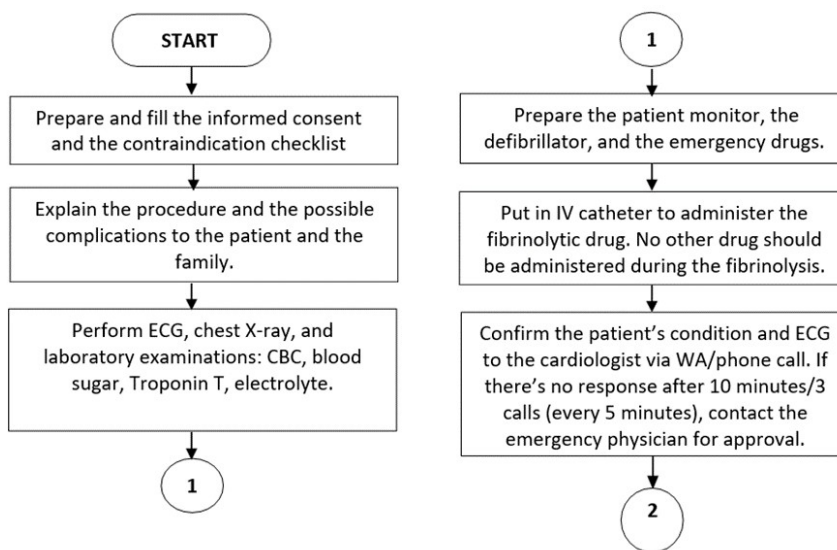
To perform a standardized fibrinolytics service in a community hospital, a standard operating procedure (SOP) has to be established. The SOP must be reviewed and approved by the relevant experts to create the best

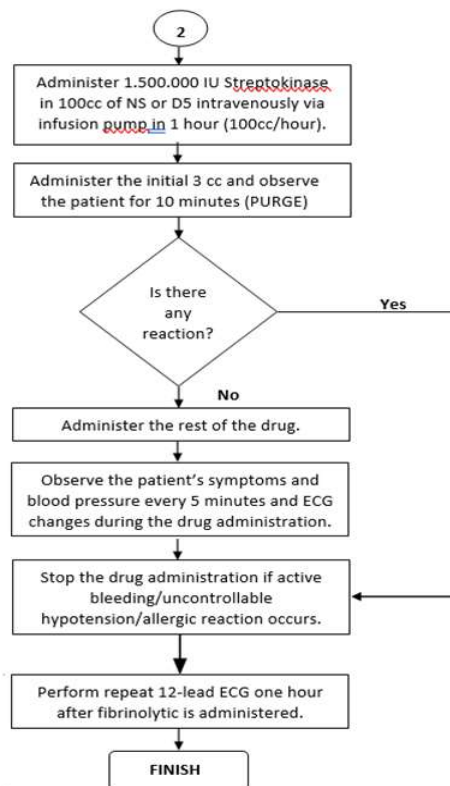
practice, then authorized by the hospital administration and medical committee. Afterwards, the information is disseminated in detail to the involved units, which are the Emergency Department (ED) and the Intensive Care Unit (ICU).⁵

Firstly, the SOP is established by the expert practitioners of all relevant fields, which are emergency physicians, cardiologists, and intensivists. It is based on the most recent advances in fibrinolytic treatment in Indonesia and around the world, and then how the procedure will be performed in the hospital is agreed upon. To reach the golden period target, an agreement is reached to perform fibrinolytic treatment in the ED by the doctor on shift and the ED nurses, under the supervision of the emergency

physician. Afterwards, in coordination with the cardiologists, it is determined whether the patients can be admitted to the community hospital or referred for rescue PCI. If the patient is admitted, then further care will be provided by the cardiologists and the intensivists.⁶

The finished SOP is filed via the medical service and the medical committee for authorization by the hospital director, so a clinical pathway can be developed for the fibrinolytic treatment in the community hospital. The pathway is then disseminated to all doctors and nurses in the ED and the ICU so they can perform the treatment accordingly whenever a STEMI patient presents in the hospital





Picture 1. Diagram of fibrinolytics treatment SOP

CONCLUSION

Development of fibrinolytics treatment in community hospitals can be done by creating an expert-reviewed SOP, providing competent human resources, and equipping the hospital with the necessary infrastructure for the service. These are all done in order to keep up with the "golden period" of STEMI patients with a thirty-minute door-to-needle timeframe and reduce the mortality rate caused by ACS in Indonesia.

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