

# Increasing Health Care Provider Awareness on Cardiovascular Disease by Malang Cardiovascular Networking System

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**Keywords:** Malang Cardiovascular Networking System, Health Care Provider Awareness, Referral System.

**Abstract:** The state of being great value of interacting and linking health care unit for the management of acute coronary syndrome (ACS) and other cardiovascular diseases (CVD) have been highlighted in the 2012 guidelines by the European Society of Cardiology (ESC) on ST-segment elevation myocardial infarction (STEMI). Our past study in Malang showed that lack of health care provider awareness contributes to high mortality due to cardiovascular disease. Malang Cardiovascular Networking System in Malang, established since 2015 facilitates referral for further management on a daily basis. A retrospective cohort study was conducted on analysing chat consultation and advocacy through Malang Cardiovascular Networking System using Whatsapp Messaging Application in Malang Raya Region for the period 2015–2019. Also, electrocardiogram machine suggested local public policy to strengthen the networking system. ECG report was sent to enhance the consultation. The increasing number of consultation was the primary end-point. The proportion of consultation in patients with cardiovascular disease (CVD) increased significantly after Malang Cardiovascular Networking System began. Daily consultation accepted on Malang Cardiovascular Networking System was 5-10 consultation, 150-200 monthly consultation, and more than 2000 (n= 2.114) consultation annually, with a total of consultation 8.456 consultations. Within 4 years, 2283 (27%) patients were referred to RSSA with CVD problem, 1040 (12.3%) patients were ACS, and the rest was non ACS (14.7%, n = 1243). The number of consultation was increased annually since 2015 with increase rate about 2.3%, 3.4%, and 5.6%, respectively. The number of ACS patients undergoing reperfusion strategy was found increase after 4-years of updating knowledge and advocacy with rate 12.1 % compared to the first year (P=0.046). Malang Cardiovascular Networking System significantly increased health care provider awareness on cardiovascular disease by increasing the number of consultations and provider's knowledge.

## 1 BACKGROUND

The state of being great value of interacting and linking health care units for the management of acute coronary syndrome (ACS) and other cardiovascular diseases (CVD) have been highlighted in the 2012 guidelines by the European Society of Cardiology (ESC) on ST-segment elevation myocardial infarction (STEMI) (Steg, 2012). The networking is aimed at providing optimal care by minimizing delays and, thereby, improving clinical outcomes. In the management of patients with STEMI, primary percutaneous coronary intervention (PPCI) is a preferred reperfusion

strategy and a better choice than pre- hospital fibrinolysis or in-hospital fibrinolysis (Wallentin, 2014).

*Malang Raya* is a region in East Java, Indonesia, encompassing the municipality of Malang. Malang has a mountainous area, also southern coast bordering Indian ocean. Malang and its suburb, Batu, had total of population 3.465.004 (2017 census) with total area of 3.882,44 km<sup>2</sup> (Pemerintah Kota Malang, 2019). In Malang, Saiful Anwar General Hospital (RSSA) is the main center and top referral hospital and the biggest percutaneous coronary intervention (PCI) and cardiovascular center, established at 2015 with more than 50 other

hospitals and primary health care referring their cardiovascular patients for PCI or further management to RSSA.

Our past study in Malang showed that lack of health care provider awareness contributes to high mortality due to cardiovascular disease. Malang Cardiovascular Networking System in Malang, established since 2015 facilitates referral for further management on a daily basis.

### 1.1 Aim

To obtain the relationship between health care provider awareness on cardiovascular disease by Malang Cardiovascular Networking System.

## 2 METHOD

A retrospective cohort study was conducted on analyzing chat consultation and advocacy through Malang Cardiovascular Networking System using Whatsapp Messaging Application in *Malang Raya* Region for the period 2015–2019. Whatsapp messaging group consisted of three groups, Malang regency, Batu City and Malang City. The group member is general practitioners in primary health care, clinics, Type D, C and B Hospital.

Besides, the Malang government policy and task to complete all the public health care with one electrocardiogram machine and routinely ECG training to support and strengthen Malang ACS networking existence (Dinas Kesehatan Kota Malang, 2016). Whatsapp group received the data transmitted from a previous health care center that would refer the patient to RSSA. A pre-hospital data included name, age, type of insurance, patient's general examination line subjective, objective (vital sign, physical examination), supporting observation, especially 12-lead ECG; chest X-Ray and laboratory examination results. All the data is directly transmitted from the group consultation centered in RSSA cardiology unit, and skilled operators with direct access to RSSA received and analyzing the consultation. This method possibly decreasing the delay between referral time and increasing response and fast patient management tracks to bypass the ER, or Catheterization laboratory (cath lab), or Intensive Cardiovascular Care Unit (iCVCU).

Each consultation attached with electrocardiogram patient's result, and/or CXR of the patient. was sent to the group. The increasing number of consultation was the primary end-point. This networking system also had annual training to

the GP all around Malang greater area. The big data also conducted using hospital medical records. All patients referred to RSSA included ACS and non ACS patients who were admitted to RSSA from any public health care, primary clinic, and hospital operating under the area of Malang Cardiovascular Networking System between the 3 May 2015 to 30 September 2019. We record and observe the consultation data including age, genders, type of cardiovascular disease (acute coronary syndrome versus non acute coronary syndrome), date of consultation, date of admission in RSSA, date of discharge, managements and intervention types, status of discharge.

We observed two primary indicators describing the performance of the main targeted network, one for care processes and one for outcomes, using as dependent variables: The clinical characteristics and proportion of patients with ACS and non ACS admitted to RSSA, ACS treated with reperfusion strategy, the recommended and standard treatment choice of STEMI according to the guideline; increasing number of consultation and referral cases.

To evaluate the relationships between the performance indicators and awareness of health care providers and to take the systematical structure of the data into account, we performed multilevel logistic regression with random intercepts for hospitals, controlling for potential intra-hospital correlations. Next, to investigate the gap in outcomes and the introduction of the network. We performed data analyses using SPSS 22. All p-values reported are two sided with significance threshold of  $p < 0.05$ .

## 3 RESULTS

From the final analysis we found 8.456 consultations within 4 years we accepted on Malang Cardiovascular Networking System, with the number of daily consultation was 5-10 consultation, 150-200 monthly consultation, and average annual consultation was 2.114. At first year of its existence there are 2017 consultation (2015-2016), 2060 (2016-2017), 2129 (2017-2018) and 2250 consultations in 2018-2019 (Figure 1). We noted it increased significantly over time for 4 years, with increase rate about 2.3%, 3.4%, and 5.6%, respectively.

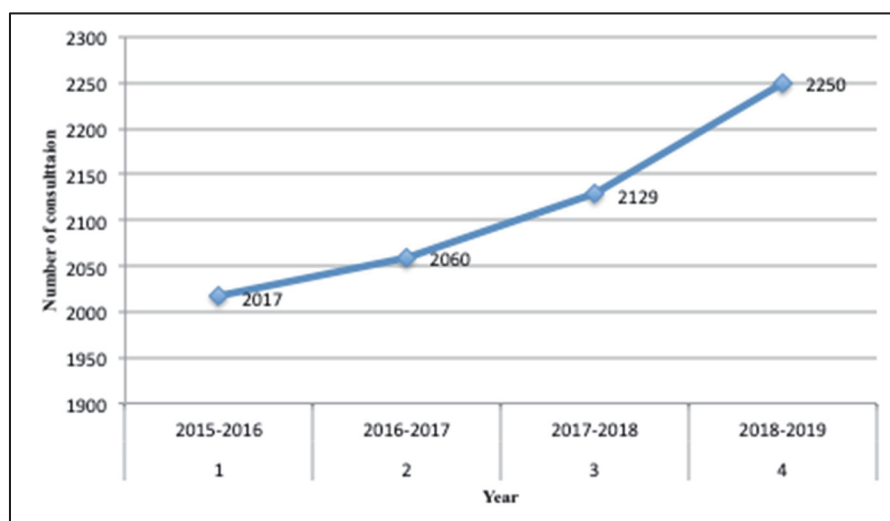


Figure 1: Number of consultation.

Table 1: Clinical Characteristics and Cases.

Variable	2015-2016 proportion (%)	2016-2017 proportion (%)	2017-2018 proportion (%)	2018-2019 proportion (%)	Total proportion (%)
Number of consultations	2.017	2.060	2.129	2.250	8.456
Referred to RSSA	474 (20.7)	515 (22.5)	635 (27.8)	659 (28.8)	2.283 (27)
Patient's diagnosis					
ACS	196 (41.3)	228 (44.3)	275 (43.3)	341 (51.8)	1040 (45.5)
Non ACS	278 (48.7)	287 (45.7)	360 (46.7)	318 (48.2)	1243 (54.5)
Management strategy of ACS					
Reperfusion	91 (46.2)	121 (53)	152 (55.2)	199 (58.3)	563 (44.1)
Non reperfusion	105 (43.8)	107 (47)	123 (54.8)	142 (41.7)	477 (45.9)

### 3.1 Clinical Characteristics

The total number of consultations has been increased significantly, as we saw in Table 1. At its year of launched, 2015-2016 there 2017 consultation, and in the end of 4-years existence there were 2250 consultation (increased 11.5 %) at average the number of patient referred to RSSA for further treatment was 27% (2.283 cases) among 4 years. From this group there were 1040 cases (45.4%), and the rest was non ACS (54.5%) ACS.

The group of patients with non ACS cases was mostly patient with heart failure, atrial fibrillation, other arrhythmia disturbances, acute limb ischemia, and any others cardiovascular disease. The patient referred was 54.5 % (n=1243).

### 3.2 Management Strategy

The majority of ACS patients were diagnosed with STEMI. Among those with STEMI, reperfusion was not done in most patients. On most STEMI patients referred for reperfusion strategy such as primary percutaneous coronary intervention (PPCI), over half of them were given fibrinolysis. The number of reperfusion strategy was 44.1 % (563 cases) from 1.040 cases of ACS referred to RSSA, and the remaining were not. It could be

Caused by the patient had been undergone a PPCI or fibrinolytics from the previous hospital, patients with autolysis STEMI, patients with onset more than 3 days, or patients with conservative treatment.

The number of ACS patients undergoing reperfusion strategy was found to increase after 4-years of updating knowledge and advocacy, with rate 5.6% compared to the first year ( $P=0.046$ ). The awareness of health care providers was achieved on their top level since their knowledge increased too. Technology based management is significantly support the successful of cardiovascular networking. General practitioners and/or other specialists had been more aware of cardiovascular disease especially ACS cases.

According to the guideline, we fulfilled the recommendation for the cardiovascular network, especially reperfusion network to achieve speed target time, delivery for cardiovascular disease therapy. We were tailored network for the community, and network itself respond to local conditions and surroundings, easy to access, gain support and acceptance from all stakeholders, and adaptability to new knowledge.

Somehow, most parts of the world existed cardiovascular networks are VIENNA STEMI network and SAMU system in Europe, The Vital Heart Network in Canada, and any other STEMI and cardiovascular alert team in United States, India, China, Russia, Australia, Latin America, and South Africa.

Huber *et al* declared the essential ST-elevation myocardial infarction system of care consist of single telephone emergency number, ambulances (vehicles, helicopters, planes), equipped with 12 lead ECGs and defibrillators, and staffed with physicians or well-trained paramedics, capable of basic and advanced cardiac life support, occasionally automatic ECG interpretation or ECG telemetry, direct telephone access to catheterization laboratory, protocols for standardized care, cardiologist or intensive care specialist as a network leader, involvement of healthcare authorities, public information campaigns, regular meeting of involved parties, and prospective registry (Abdul, 2019).

As cardiovascular networking system provided those list above too, we already completed the essential cardiovascular networking system and care except the ambulances facility. Thus we relied social messaging in order to make easier access to bigger cardiovascular centers and shortening the delay. More than that, beside its role on behalf to management pre hospital of cardiovascular disease, another possible function of cardiovascular network was monitoring post discharge patients in primary health care and home. The possible monitoring checklist we can performed are cardiac symptoms, physical and cardiac examination, drugs, and simple

cardiac rehabilitation at home. A study reported by Chiantera *et al.* in Italy contemplate the use of ACS networking and usual care, 63% of patients discharged after ACS was found to exhibit cardiac symptoms 1-month post discharge. ACS networking was found to be able to slightly reduce hospital readmissions (ACS networking 44% versus usual care 56%) while at the same time better identifying true from false angina among the patients (ACS networking 85% true positive for cardiac cause versus usual care 55%) (Chiantera, 2016).

## 4 CONCLUSION

Malang Cardiovascular Networking System significantly increased health care provider awareness on cardiovascular disease by increasing number of consultation and provider's knowledge. Networking system like Malang Cardiovascular network including electrocardiogram machine facilities, and whatsapp group and bigger medical center with catheterization laboratories facility along 24/7, and within a distance that can achieve recommended transport are able to raise guideline adherence and patient outcomes by streamlining the critical pre- and intra-hospital processes as well as improving timely access to invasive procedures, recommended management and best outcome from the patient.

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