



MONASH University

***Prehospital Care in Indonesia:
Preparation of the Nursing Workforce
to Deliver an Ambulance Service***

Suryanto

Master in Nursing

A thesis submitted for the degree of Doctor of Philosophy at

School of Nursing and Midwifery

Faculty of Medicine, Nursing, and Health Sciences

Monash University

2017

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Abstract

Background

Indonesia recently launched the 119 Emergency Medical Service (EMS) for prehospital care, limited to 27 locations in Indonesia. However, this EMS system has not been implemented in the city of Malang, East Java, the main location of this research. The most recent EMS system available in Malang was the 118 Emergency Ambulance Services, which ceased operations in late 2005. Most people in Malang requiring prehospital care are transported using public transport or private vehicles. Ambulance services in Malang are either from hospitals or *puskesmas* (community health centres). These ambulances are staffed by a driver and nurses who receive no formal training in prehospital care.

Aim

This research aims to identify the current status of prehospital care in Indonesia, its policy, operational and workforce challenges and the barriers to its development and to make recommendations for improvement. The three objectives of this study were (1) to identify if nursing graduates are work ready to be ambulance nurses, (2) to describe the perceived competence level of ambulance nurses in the prehospital setting, and (3) to outline decision makers' perspectives of the barriers and solutions associated with implementing an EMS system in Indonesia. In order to meet each objective, separate studies were designed.

Methods

This research consisted of three main studies, two quantitative studies and one qualitative study. Study One utilised a paper survey with 394 nursing graduates as participants. For Study Two, questionnaires were distributed to 185 hospital-based and 372 *puskesmas*-based ambulance nurses.

Interviews were conducted in Study Three, which involved prehospital services and hospitals in six Indonesian cities: Jakarta, Palembang, Surabaya, Makassar, Malang, and Denpasar. Quantitative data analyses for Studies One and Two were undertaken using Statistical Package for the Social Sciences (SPSS), while thematic analysis (Braun and Clarke (2006) was used for Study Three.

Results

Study One shows that the “practical skills” domain related to prehospital care had the lowest score for work readiness among nursing graduates to be an ambulance nurse. These results are concomitant with those of Study Two, where the score for perceived knowledge of prehospital care was the lowest among ambulance nurses. Training experience makes a significant contribution to perceived knowledge, attitudes, and practice regarding prehospital care. In addition, prehospital care knowledge and practice among hospital-based ambulance nurses are significantly higher than *puskesmas*-based ambulance nurses. These limited qualifications among prehospital providers support the results of Study Three, where lack of quality and quantity of prehospital care human resources are an obstacle in implementing an EMS system in Indonesia. Other factors include perceived insufficient government support, ambulance service management problems at the Emergency Department hospital level, community awareness for the importance of an EMS system, insufficient ambulance vehicles, and traffic. In order to overcome these problems, participants in Study Three suggest that the implementation 119 EMS can be expanded into other areas of Indonesia by increasing local creativity, increasing prehospital provider and government support, and empowering the community.

Conclusion

The results of the research have added to the overall knowledge of prehospital care in Malang, East Java, and to some extent, Indonesia, both in terms of human resources and the prehospital care

system. The findings may also be used to improve education and clinical practice for prehospital care in Indonesia.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signature:



Print Name: Suryanto

Date: 18/12/2017

Publications during enrolment

1. **Suryanto**, Plummer, V., & Boyle, M. (2017). Healthcare system in Indonesia. *Hospital Topics*,95(4), 82-89.
2. **Suryanto**, Boyle, M., & Plummer, V. (2017). The pre-hospital and healthcare system in Malang, Indonesia. *Australasian Journal of Paramedicine*,14(2).
3. **Suryanto**, Plummer, V., & Boyle, M. (2016). EMS systems in lower-middle income countries: A literature review. *Prehospital and Disaster Medicine*,32(1), 64–70.
4. **Suryanto**, Plummer, V., & Boyle, M. (2016). Financing healthcare in Indonesia. *Asia Pacific Journal of Health Management*,11(2), 33–38.
5. **Suryanto**, Boyle, M., & Plummer, V. *Health Workforce in Indonesia*. Accepted. Asia Pacific Journal of Health Management.
6. **Suryanto**, Boyle, M., & Plummer, V. *Work Readiness to be an ambulance nurse among nursing graduates in Indonesia*. Submitted to Journal of Nursing Education.
7. **Suryanto**, Plummer, V., & Boyle, M. *Knowledge, attitude, and practice of ambulance nurses in prehospital care in Indonesia*. Accepted. Australasian Emergency Nursing Journal.
8. **Suryanto**, Plummer, V., & Boyle, M. *Barriers and solutions in implementing an EMS system in Indonesia: A qualitative study*. Submitted to Prehospital and Disaster Medicine journal.
9. Boyle, M., Wallis, J., & **Suryanto**. (2016). Time to improve pre-hospital care in developing countries. *Australasian Journal of Paramedicine*, 13(3).
10. Boyle, M., **Suryanto**, Suharsono, T., & Plummer, V. *Developing an ambulance nurse course for Indonesia*. Submitted to Nurse Education Today journal.

Thesis including published works declaration

I hereby declare that this thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

This thesis includes four original papers published in peer reviewed journals, two accepted for publication, and two submitted publications. The core theme of the thesis is the current state of prehospital care in Indonesia. The ideas, development and writing up of all the papers in the thesis were the principal responsibility of myself, the student, working within the School of Nursing and Midwifery in the Faculty of Medicine, Nursing and Health Sciences under the supervision of Associate Professor Virginia Plummer and Associate Professor Malcolm Boyle, formerly of the Department of Community Health and Paramedic Practice at Monash University and currently working in the School of Medicine at Griffith University.

In the case of seven chapters my contribution to the work involved the following:

Thesis Chapter	Publication Title	Status	Nature and % of student contribution	Co-author name(s) Nature and % of Co-author's contribution*	Co-author(s), Monash student Y/N*
2	<i>Healthcare System in Indonesia</i>	<i>Published</i>	<i>60%. Concept and collecting data and writing first draft</i>	1) <i>Virginia Plummer, input into manuscript 20%</i> 2) <i>Malcolm Boyle, input into manuscript 20%</i>	<i>No</i>
2	<i>Financing Healthcare in Indonesia</i>	<i>Published</i>	<i>60%. Concept and collecting data and writing first draft</i>	1) <i>Virginia Plummer, input into manuscript 20%</i> 2) <i>Malcolm Boyle, input into manuscript 20%</i>	<i>No</i>
2	<i>Health Workforce in Indonesia</i>	<i>Accepted for publication</i>	<i>60%. Concept and collecting data and writing first draft</i>	1) <i>Malcolm Boyle, input into manuscript 20%</i> 2) <i>Virginia Plummer, input into manuscript 20%</i>	<i>No</i>
2	<i>The Pre-hospital and Healthcare System in Malang, Indonesia</i>	<i>Published</i>	<i>60%. Concept and collecting data and writing first draft</i>	1) <i>Malcolm Boyle, input into manuscript 20%</i> 2) <i>Virginia Plummer, input into manuscript 20%</i>	<i>No</i>

3	<i>EMS Systems in Lower-Middle Income Countries: A Literature Review</i>	<i>Published</i>	<i>60%. Concept and collecting data and writing first draft</i>	1) <i>Virginia Plummer, input into manuscript 20%</i> 2) <i>Malcolm Boyle, input into manuscript 20%</i>	<i>No</i>
4	<i>Work Readiness to be an Ambulance Nurse among Nursing Graduates in Indonesia</i>	<i>Submitted</i>	<i>60%. Concept and collecting data and writing first draft</i>	1) <i>Malcolm Boyle, input into manuscript 20%</i> 2) <i>Virginia Plummer, input into manuscript 20%</i>	<i>No</i>
4	<i>Knowledge, Attitude, and Practice of Ambulance Nurses in Prehospital Care in Indonesia</i>	<i>Accepted for publication</i>	<i>60%. Concept and collecting data and writing first draft</i>	1) <i>Virginia Plummer, input into manuscript 20%</i> 2) <i>Malcolm Boyle, input into manuscript 20%</i>	<i>No</i>
5	<i>Barriers and Solutions in Implementing an EMS System in Indonesia: A qualitative study</i>	<i>Submitted</i>	<i>60%. Concept and collecting data and writing first draft</i>	1) <i>Virginia Plummer, input into manuscript 20%</i> 2) <i>Malcolm Boyle, input into manuscript 20%</i>	<i>No</i>

I have not renumbered sections of submitted or published papers in order to generate a consistent presentation within the thesis.

Student signature:



Date: 18/12/2017

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the student's and co-authors' contributions to this work. In instances where I am not the responsible author I have consulted with the responsible author to agree on the respective contributions of the authors.

Main Supervisor signature:



Date: 18/12/2017

Acknowledgements

I would like to express my appreciation to Associate Professor Virginia Plummer and Associate Professor Malcolm Boyle for their guidance during the term of my candidature. Without their valuable assistance, this work would not have been completed.

I am also indebted to Associate Professor Susan Lee for her support and cooperation during my candidature.

This thesis would also not have been possible without the support of the Australia Awards Scholarship, formerly known as Australia Development Scholarship.

I would also like to thank Nathanael Shook for editing this thesis.

I would also like to thank the staff and my fellow PhD students in the School of Nursing and Midwifery within the Faculty of Medicine, Nursing and Health Sciences for all their help and support.

I would also like to express my gratitude towards my beloved wife, Astika, for the encouragement which helped me in completion of this study. Finally, I dedicate this thesis to my parents, wife, and lovable children, Zafina and Zahrany.

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List of Abbreviations

AED	Automated External Defibrillator
AGD Dinkes	<i>Ambulans Gawat Darurat Dinas Kesehatan</i> (Health Department Ambulance Services)
ALS	Advanced Life Support
BLS	Basic Life Support
BN	Bachelor of Nursing
BPJS	<i>Badan Penyelenggara Jaminan Sosial</i> (Social Security Agency)
CATS	Centralised Accident and Trauma Services
CI	Confidence Intervals
CPIRD	Collaborative Project to Increase the Production of Rural Doctors
CPR	Cardio Pulmonary Resuscitation
CSMBS	Civil Servant Medical Benefit Scheme
EAS	Emergency Ambulance Services
ECGs	Electrocardiographs
EDs	Emergency Departments
EMRI	Emergency Management and Research Institute

EMS	Emergency Medical Services
EMTs	Emergency Medical Technicians
ENT	Ear, Nose, and Throat
GDP	Gross Domestic Product
GELS	General Emergency Life Support
HoEDs	Head of Emergency Departments
JKN	<i>Jaminan Kesehatan Nasional</i> (National Health Security)
JPS	<i>Jaring Pengaman Sosial</i> (The Social Safety Net)
LMICs	Lower-Middle Income Countries
MoU	Memorandum of Understanding
MSW	Medical Welfare Scheme
MUHREC	Monash University Human Research Ethics Committee
NAS	National Ambulance Service
NCC	National Command Centre
ODOD	One District, One Doctor
PSCs	Public Safety Centres
PTT	<i>Pegawai Tidak Tetap</i> (contracted staff)

RN	Registered Nurse
SD	Standard Deviation
SPGDT	<i>Sistem Penanggulangan Gawat Darurat Terpadu</i> (Comprehensive System of Emergency management)
TEMS	Tulungagung Emergency Medical Services
TNC	Trauma Nursing Care
UCS	Universal Coverage Scheme
UN	United Nation
VHWs	Village Health Workers
WB	World Bank
WHO	World Health Organisation

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Glossary – Bahasa Indonesia

AGD Dinkes	<i>Ambulans Gawat Darurat Dinas Kesehatan</i> or health department ambulance services. These ambulance services were organised by the Jakarta provincial government and were the conversion of the 118 ambulance emergency service.
Ambulans	Ambulance, a vehicle for transporting patients in emergency situations.
Askes	<i>Asuransi Kesehatan</i> or health insurance. <i>Askes</i> was established in 1968 as a health insurance programme for civil servants, pensioners of civil servants and armed forces, and their families. This health insurance was merged into BPJS in 2014.
Askeskin	<i>Asuransi Kesehatan Keluarga Miskin</i> or health insurance for the poor. <i>Askeskin</i> was established in 2004 and replaced the <i>Kartu Sehat</i> covering low-income beneficiaries. The programme was ended in 2008 and replaced with <i>Jamkesmas</i> .
BPJS	<i>Badan Penyelenggara Jaminan Sosial</i> or Social Security Agency. The BPJS was launched in 2014 to offer universal healthcare insurance for all people in Indonesia. This insurance programme is the result of merging all government health insurance in Indonesia, including <i>Askes</i> , <i>Jamsostek</i> , <i>Jamkesmas</i> , and <i>Jamkesda</i> .
Desa	Village, the lowest level of government administration in Indonesia and which has rural connotations. The <i>desa</i> is headed by a village chief (<i>Kepala Desa</i>), who is elected by popular vote. The <i>desa</i> is divided non-administratively into local communities that manage a certain number of households called <i>Rukun-Warga</i> (RW), which are further divided into neighbourhood groups called <i>Rukun-Tetangga</i> (RT).
Dukun	Shaman, a traditional healer, spirit medium, expert in traditions and customs, and on occasion sorcerers and users of black magic.
Jamkesda	<i>Jaminan Kesehatan Daerah</i> or regional health insurance. <i>Jamkesda</i> was established in 2010 and managed by regional

	government in order to expand <i>Jamkesmas</i> coverage. This health insurance was merged into the BPJS in 2014.
Jamkesmas	<i>Jaminan Kesehatan Masyarakat</i> or community health insurance. <i>Jamkesmas</i> was established in 2008 as a health insurance programme for the poor and was replaced with the <i>Askeskin</i> programme.
Jampersal	<i>Jaminan Persalinan</i> or delivery insurance. <i>Jampersal</i> was established in 2011 as a health insurance programme for maternal services, including antenatal care, delivery care, postnatal care, neonatal care and contraception. This insurance expanded <i>Jamkesmas</i> coverage.
Jamsostek	<i>Jaminan Sosial Tenaga Kerja</i> or social insurance for workers. <i>Jamsostek</i> was established in 1992 as a health insurance programme for formal sector employees. This health insurance was merged into the BPJS in 2014.
JPS	<i>Jaring Pengaman Sosial</i> or the social safety net programme. The JPS is a governmental programme providing subsidies for medical services to the poor.
Kabupaten	Regency, a political subdivision of a province in Indonesia at the district level headed by a regent (Indonesian: <i>Bupati</i>). <i>Kabupaten</i> is sometimes translated as municipality. <i>Kabupaten</i> is at the same government level as <i>Kota</i> (city). The difference between <i>Kabupaten</i> and <i>Kota</i> lies in differing demographics, size, and economics. Generally, the <i>Kabupaten</i> has a larger area than a city.
KartuSehat	<i>Kartu Sehat</i> was a government health insurance programme that subsidised healthcare for the poor established in 1994 and reinforced in 1998. <i>Kartu Sehat</i> was replaced with <i>Asuransi Kesehatan Keluarga Miskin (Askesin)</i> in 2004.
Kecamatan	Sub-district level of government that represents an area within a regency or city. The head of a district is known as a <i>Camat</i> . <i>Camats</i> are civil servants, responsible to the regent (for a regency) or to the mayor (for a city).
Kelurahan	Administrative village, at the same government level as a <i>desa</i> . An administrative village is headed by a <i>Lurah</i> , a civil servant appointed by local government (city or regency) and directly responsible to their <i>Camat</i> . A <i>Kelurahan</i> has fewer local matters than a <i>desa</i> does.

Kota	City, at the same government level as a <i>Kabupaten</i> (regency) but headed by a mayor (Indonesian: <i>Walikota</i>). The difference between a <i>Kabupaten</i> and <i>Kota</i> lies in differing demographics, size, and economics. Generally, the <i>Kota</i> has non-agricultural economic activities.
PT Askes	<i>Perseroan Terbatas Asuransi Kesehatan</i> or limited company for health insurance. The PT Askes is a company organising an Askes programme.
PTT	<i>Pegawai Tidak Tetap</i> or contracted staff. It was compulsory for newly graduated doctors to be contracted staff and to provide service in remote areas.
Polindes	<i>Pondok Bersalin Desa</i> or village delivery centres. A <i>Polindes</i> is a village health centre staffed with midwives and used mainly for delivery services.
Poskesdes	<i>Pos Kesehatan Desa</i> or village health post. The <i>Poskesdes</i> is another community empowering activity at the village level similar to a <i>Polindes</i> but with broader activities, which are not only for maternal and infant services, but also general health services, including health surveillance of nutrition, environment, emergencies, and natural disaster relief.
Posyandu	<i>Pos Pelayanan Terpadu</i> or integrated health post. The <i>Posyandu</i> is a community empowering activity at the village level, which focuses on providing basic healthcare services for mothers, infants, and toddlers. The <i>Posyandu</i> has five major programs: mother and children's health, family planning, immunisation, nutrition, and prevention and treatment of diarrhoea. On average, there are three to four <i>Posyandus</i> in each village.
Puskesmas	<i>Pusat Kesehatan Masyarakat</i> or community health centres. These are sub-district health facilities staffed with medical doctors, nurses, and midwives. <i>Puskesmas</i> may have in-patient ward facilities. They coordinate the main services for preventive and curative programs, especially for antenatal and postnatal care, immunisation, family planning services, nutrition and sanitation consultations, and dental services.
Pustu	<i>Puskesmas Pembantu</i> or auxiliary health centre. A <i>Pustu</i> is a sub-community health centre in each village covering around 3,000 people. Its function is to increase the quality and outreach of the <i>puskesmas</i> at the village level.

SPGDT

Sistem Penanggulangan Gawat Darurat Terpadu or comprehensive system of emergency management. The programme was initiated in 2000 to elaborate prehospital emergency care, in-hospital emergency care, and inter-hospital referral using cross-programme and multi-sector collaboration. The national regulation for the SPGDT was launched in May 2016 by the Ministry of Health of Indonesia.

Glossary – English

118 Ambulance Emergency Services	Ambulance service implemented in Indonesia from 2000 to 2005 in 18 cities across Indonesia.
119 Emergency Medical Services	Ambulance service launched in July 2016 and implemented at 27 locations in Indonesia during the launch.
Compulsory Service	Programme to reduce an imbalance in the distribution of health workers in Indonesia, which was applied from 1961 to 2003. All graduates, including health institution graduates, had to serve for at least five years after completing their studies.
Decentralisation	Act of reorganising a system, such as a political unit, so that power is shifted from a central or upper authority to a less central authority, or is reorganised as such.
Special Assignment	Programme to reduce an imbalance in the distribution of health workers in Indonesia. It was started in 2009 with the objective to increase access and quality of health services in disadvantaged areas, border areas, small islands, areas with health difficulties, and Class C and D hospitals.
Unorganised Ambulance Services	Ambulance services without a centralised call centre, which are used by calling either a <i>puskesmas</i> or a hospital's Emergency Department to request ambulance services.
Formal training/education	Training provided by authorised institutions and the participants will have a degree at the completion of the training.
Informal training/education	Training provided by any institutions and the participants will not have a degree at the completion of the training.

Chapter 1 Introduction

1.1 Background

Quality and access to prehospital care is an urgent health issue that needs to be addressed by Lower-Middle Income Countries (LMICs). Based on World Health Organisation (WHO) data, 90% of global injuries occur in LMICs and are the cause of approximately 5.8 million deaths annually (Nielsen et al., 2012). This may arise from a greater use of vehicles in LMICs, poor road conditions, a lack of public awareness of the importance of road safety, and the inability to provide first aid to the victims (Jena, Dubey, & Dhal, 2010). Mortality rates in road traffic accidents can be reduced by establishing well-organised prehospital care/emergency medical services (Ahidjo et al., 2011; Joshipura, 2008; Mould-Millman, Rominski, & Oteng, 2014) and trauma care facilities (Oestern, Garg, & Kotwal, 2013; Tahir et al., 2012). Similar to other LMICs, prehospital care in Indonesia remains underdeveloped. Most patients are transported to hospital using public transport or private vehicles without sufficient care during transportation (Haedar, 2011). Other patients are retrieved by ambulances provided by hospitals or *puskesmas*, and staffed by a driver and an ambulance nurse.

The previous EMS system, known as the 118 Emergency Ambulance Services (EAS), was established in seven cities in Indonesia in 2000 but was unsuccessfully implemented due to financial issues and was later discontinued (Pusponegoro, 2003). There is no information identifying the date the system ceased operations, but in Malang, one of the cities which had an EMS system, it ceased in late 2005. A breakthrough occurred in the prehospital care system of Indonesia 10 years later with the launch of the 119 Emergency Medical Service by the Ministry of Health of Indonesia in July 2016 (Dzulfiqar & Riza, 2016). The system has been implemented in 27 locations in the country, mostly on the island of Java, with the establishment of the National Command Centre (NCC) in Jakarta and Public Safety Centres (PSCs) (Dzulfiqar & Riza, 2016).

Currently, ambulance services in Malang and other areas of Indonesia where the 119 EMS system has not been implemented are hospital-based or *puskesmas*-based, and such services can be activated by calling the hospital or the *puskesmas*. In 2015, there were 9,754 *puskesmas* and 2,488 hospitals in Indonesia (Kementerian Kesehatan Republik Indonesia, 2016b). *Puskesmas* are community health centres at the sub-district level with each centre staffed by medical doctors, nurses, and midwives (Heywood & Choi, 2010). The ambulance service is not centrally organised, most patients are transported to a hospital Emergency Department (ED) by a passer-by, private vehicle, or public transport. In Saiful Anwar Hospital, the largest hospital in Malang, 11% of patients were transported to the ED by ambulances, while 89% of patients were transported using other vehicles (Haedar, 2011). There are various reasons for this and they are discussed further in Chapter Two.

The development of prehospital care in Indonesia is related to the development of the country's healthcare system. There have been several changes in the Indonesian healthcare system since Indonesia gained its independence in 1945 (Heywood & Choi, 2010). The country's high population, cultural diversity, its nature as an archipelago (Shields & Hartati, 2003), and the political and government situation (Kristiansen & Santoso, 2006) have influenced the development of the healthcare system. In terms of financial support, there have been two major transitions in Indonesian healthcare: the implementation of a decentralised health system and universal health insurance coverage (Rokx, Schieber, Harimurti, Tandon, & Somanathan, 2009). Decentralisation was initiated in 2001 after the fall of the Suharto regime (Kristiansen & Santoso, 2006) and led to provincial governments managing and organising the healthcare services for the community, including managing health funding (Abdullah, Hort, Abidin, & Amin, 2012; Heywood & Choi, 2010). Universal health insurance coverage, called *Badan Penyelenggara Jaminan Sosial (BPJS)*, was launched in January 2014 (Lancet Editorial, 2014), and it is estimated that it will cover all people in Indonesia by the end of 2019 (Kementerian Kesehatan Republik Indonesia, 2015). The BPJS covers

ambulance services but for referral purposes only, not for prehospital care. It includes a condition that both originating and destination health institutions must have a funding agreement with the BPJS (Badan Penelitian dan Pengembangan Kesehatan, 2014). In the case of an emergency outside hospitals or *puskesmas*, such as traffic accidents or a heart attack, or any referral between health institutions that have no funding agreement with the BPJS, the ambulance service cost is not covered by the monthly premium (Badan Penelitian dan Pengembangan Kesehatan, 2014), and the patient must pay for ambulance services or use other forms of transportation.

As with other LMICs, Indonesia has inequality of healthcare provider distribution (Meliala, Hort, & Trisnantoro, 2013). This inequality is due to the wide geographic coverage of its various facilities and health status across the country (Rokx et al., 2009). Most doctors practice in urban areas, with a mere 20% providing services in rural areas where 70% of Indonesians live (Meliala et al., 2013). There have been several actions undertaken by the Indonesian government to minimise this inequality, including the compulsory deployment policy for medical school graduates, the *Pegawai Tidak Tetap* (PTT) or contracted staff programme (Rokx et al., 2010), a decentralisation programme that allows provincial and district government authorities to manage their community services, including healthcare worker recruitment (Meliala et al., 2013), and a Special Assignment Programme (Kementerian Kesehatan Republik Indonesia, 2013).

In terms of prehospital care, the paramedic profession is not yet recognised in Indonesia (Pitt & Puspongoro, 2005); the ambulance is staffed by nurses working at hospital EDs or *puskesmas*. Very few have been trained in advanced emergency care, and it is likely that in rural areas and most *puskesmas*, ambulance nurses have limited training in prehospital emergency care due to a lack of formal education for ambulance nurses in Indonesia. Nursing education has an important role in providing competent nurses, including for the prehospital care setting. Undergraduate nursing education in Indonesia is implemented based on the core curriculum provided by the Indonesian

Nursing Collegiums. Prehospital care is currently part of the emergency nursing content, which takes up to four out of 104 credit points (Kolegium Ners Indonesia, 2015). With limited presence of emergency nursing topics, the curriculum focuses more on in-hospital emergency nursing, not on prehospital care. Since the nursing curriculum in Indonesia focuses on preparing nursing students for in-hospital care, the readiness to be an ambulance nurse among nursing graduates needs to be explored.

This research has been undertaken mainly in Malang, an area in East Java, the second most populated province in Indonesia after West Java (Kementerian Kesehatan Republik Indonesia, 2013). Malang consists of three districts, Malang Regency (Kabupaten Malang), Malang City (Kota Malang), and Batu City (Kota Batu). Malang has the most advanced emergency care education in East Java and potentially all of Indonesia. This is because Malang has an Emergency Medicine Specialist Programme, the only programme in Indonesia, and a Master's in Nursing programme for those majoring in emergency nursing, the first of their kind in Indonesia. This study has also involved five other large cities in Indonesia: Jakarta, Palembang, Surabaya, Makassar, and Denpasar. These cities have been identified for inclusion in the study because they implemented the 118 EAS in 2000 (Pitt & Puspongoro, 2005).

This research began by exploring the development of the Indonesian healthcare system, with a focus on the Malang area, the health status of the community, health facilities, emergency services, the workforce, and associated financing. This research focuses on two elements of prehospital care, human resources and the system of prehospital care. The prehospital human resources of this study includes nursing graduates who may work on ambulances and experienced ambulance nurses. The prehospital care system includes prehospital care in the community, care during transport, and care on arrival at the receiving health facility. The system covers community access, the ambulance vehicles, both hospital and *puskesmas*-based, the drivers, and community response. This thesis

includes papers that have already been published or submitted for publication. Eight papers were produced, four have been published, two are accepted for publication, and two are submitted to peer reviewed journals. Most chapters in this thesis are composed of content from these papers.

1.2 Research Question

Based on the above description of prehospital care in Indonesia, the research question for this study was, “What is the preparedness of nursing workforce in Indonesia to deliver an ambulance service and the associated system issues that influence the preparedness of nurses for this work?”

1.3 Objectives

This research was undertaken to identify the current status of prehospital care in Indonesia. The objectives were to explore the preparedness of the nursing workforce in Indonesia to deliver an ambulance service and the associated system issues that influence the preparedness of nurses for this work. This study identified the perspectives of three different groups on prehospital care provision in Indonesia: nursing graduates who may work in ambulances, ambulance nurses as prehospital care providers, and key decision makers in prehospital care. Nursing graduates involved in this study were newly graduated nurses. Bachelor of Nursing graduates were invited to participate in this study because most nursing graduates in Malang have a bachelor’s degree. The study investigated whether nursing graduates were ready to work as ambulance nurses as well as their self-perceived preparation to enter the prehospital workforce at the end of their undergraduate training. Since there are no paramedics in Indonesia, this study focused on ambulance nurses as prehospital care providers and explored whether they were competent and ready to provide care in the prehospital setting. The decision makers involved in this study were those responsible for prehospital care services and mostly consisted of the heads of emergency departments (HoEDs) of

each hospital in the six cities involved in the study. Those six cities were identified not only because they had implemented the EMS system in 2000, but because they were in major cities in Indonesia.

In order to understand the issues of interest, the objectives of this research are as follows:

1. Identify whether nursing graduates are work ready to be ambulance nurses.
2. Describe the perceived competence level of ambulance nurses in the prehospital setting.
3. Outline the decision makers' perspectives of the barriers and solutions associated with implementing an EMS system in Indonesia.

As a result, this research consists of three main studies:

1. Work readiness to be an ambulance nurse among nursing graduates.
2. Knowledge, attitudes, and practice of ambulance nurses in prehospital care.
3. Barriers and solutions to implementing an EMS system from the perspective of decision makers.

1.4 Theoretical and Conceptual Framework

The framework underpinning this research was based on the "People-Centred Healthcare" framework implemented by the WHO. The framework consists of four domains: (1) individuals, families, and communities; (2) health practitioners; (3) healthcare organisations; and (4) health systems (World Health Organisation, 2007). Healthcare quality and safety can be enhanced by mutually strengthening these four domains. The concept of "People-Centred Healthcare" can be seen in Figure 1.

The three studies of this research are concomitant with all four domains of the framework.

Study One investigated nursing graduates' work readiness to be ambulance nurses and examined this through the "Health practitioners" domain. The study sought to determine how nursing education institutions prepared students to be ambulance nurses.

Study Two investigated the knowledge, attitudes, and practice of ambulance nurses and examined the "Health practitioners" domain. It sought to identify the competencies of ambulance nurses in Indonesia and encouraged enhancing the proficiency of prehospital care providers.

Study Three investigated barriers and solutions in implementing an EMS system in Indonesia and was associated with the "Individuals, families, and communities", "Healthcare organisations" and "Health system" domains. This study explored the problems in organising prehospital care and sought possible solutions to improve the prehospital care system in Indonesia. Based on these objectives, the people-centred healthcare framework was expected to be useful when interpreting the results of these three studies on prehospital care in Indonesia.

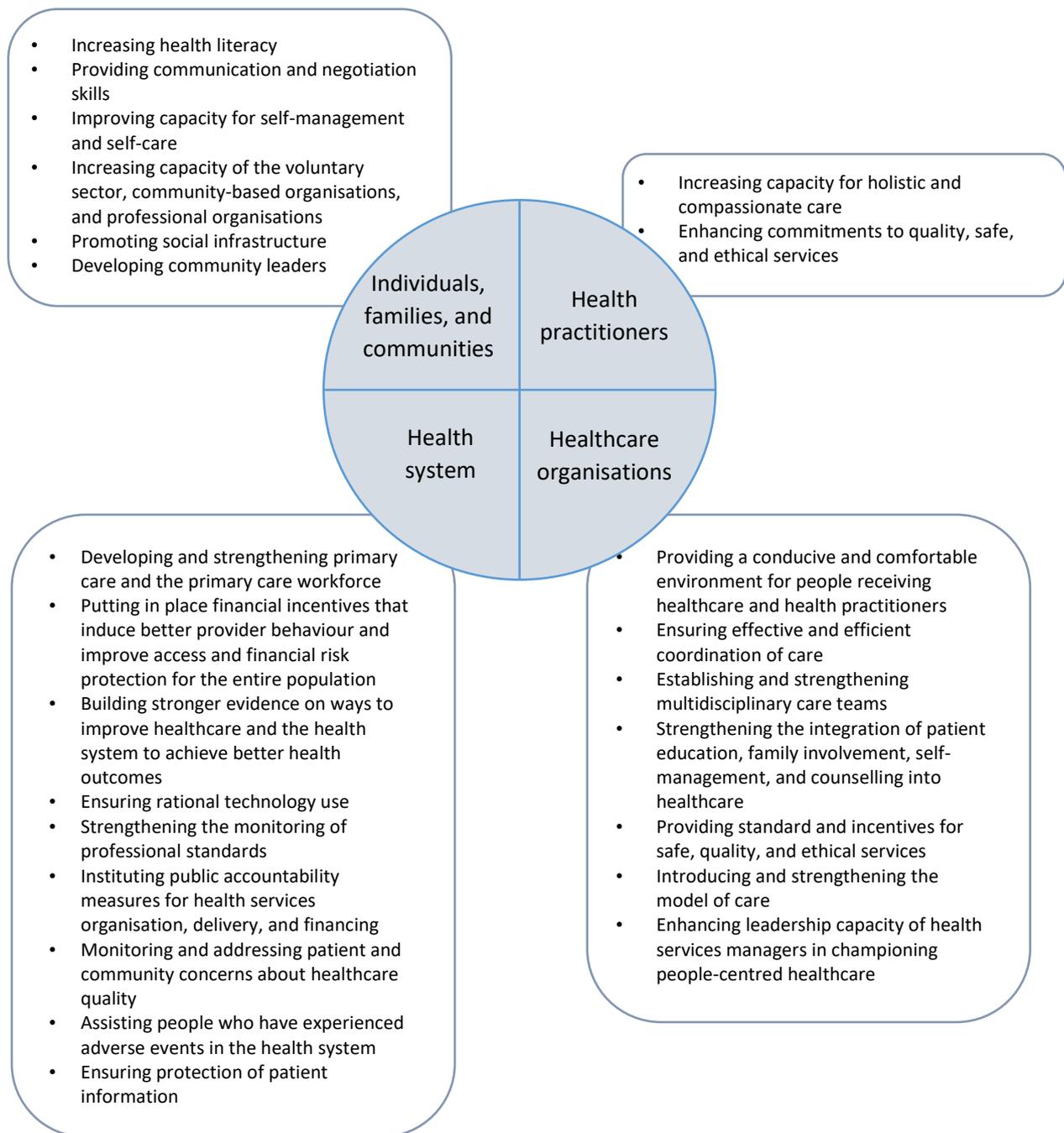


Figure 1. People-Centred Healthcare Framework (WHO, 2007)

1.5 Significance of the Research

This research was significant because it was the first empirical study of prehospital care in Malang and five other cities in Indonesia and how this care applied to the currently underdeveloped EMS system. Related research in Indonesia was undertaken more than a decade ago and looked at prehospital care more generally (Pitt & Pusponegoro, 2005) and 20 years ago from the perspective of motorbike injuries (Conrad, Bradshaw, Lamsudin, Kasniyah, & Costello, 1996). This study concentrated specifically on human resources, barriers and solutions to the implementation of an EMS system as reported by key stakeholders, such as HoEDs, for the first time and is likely to inform the care of the Indonesian community requiring prehospital care.

1.6 Chapter Summary

This research has two main foci, the prehospital care system and human resources. The prehospital care in Indonesia is not well-organised, therefore, a study investigating the problems and possible solutions to implementing the EMS system could be used to better understand the status of prehospital care in Indonesia. This research also focused on human resources in prehospital care both ambulance nurses and nursing graduates who may work in prehospital setting. Both areas of study may be used as baseline data to improve the prehospital care in the country. Examining the prehospital care system in Indonesia is essential because of the limited number of published studies on this topic to date. The development of healthcare in Indonesia differs from other countries; therefore, fundamental information about the country's healthcare system is discussed in the following chapter to better understand the context of the research.

Chapter 2 Context

2.1 Introduction

This chapter explains the context of the present research. It begins with a description of the healthcare system in Indonesia, including the roles of the government in health services, the health facilities available in the country, and prehospital and in-hospital emergency care. This is followed by a description of the financing of healthcare. The development of health insurance in Indonesia, the current implementation of universal health insurance, and the role of the government and other sectors in health financing are described. Information on the number of healthcare providers and their distribution are also discussed. Since this research was mainly undertaken in Malang, the healthcare system and prehospital care in Malang are also described.

2.2 Healthcare System in Indonesia

The first paper describes the healthcare system in Indonesia, including the roles of government in healthcare management, healthcare facilities, and emergency care. Despite the positive outcomes of health development in Indonesia, including a decrease in the mortality rate and increase in total health expenditure, the World Bank's report showed that the healthcare system in the country remains inefficient (Rokx et al., 2009). It is believed that the implementation of BPJS can improve health services. *Puskesmas* play an important role in health maintenance in society, including prehospital care. Even though the current 119 EMS system was launched in July 2016, in general, prehospital care in Indonesia remains underdeveloped because only 27 locations have implemented the latest EMS system. Those 27 locations are in 14 out of 34 provinces (41.2%) with varied numbers of PSCs in each province. The PSCs are located in the regencies or cities of the provinces, however, there are 514 regencies and cities in Indonesia. This means that 5.3% of regencies/cities of Indonesia

have implemented the system and the remaining areas still depend on unorganised ambulance services. The goal of the current EMS system is to be implemented in all areas within two years, after the establishment of the Indonesian Health Ministry's regulation of SPGDT, i.e., by 2018 (Kementerian Kesehatan Republik Indonesia, 2016a). The description of the prehospital care system in Indonesia in the following paper highlights the importance of this research.



Healthcare System in Indonesia

Suryanto^{a,b}, Virginia Plummer^{a,c}, and Malcolm Boyle^d

^aSchool of Nursing and Midwifery, Monash University, Frankston, Australia; ^bSchool of Nursing, Brawijaya University, Malang, Indonesia; ^cPeninsula Health, Frankston, Australia; ^dSchool of Medicine, Griffith University, Queensland, Australia

ABSTRACT

The cultural diversity, its archipelago, and the major religion being Muslim have all influenced the development of the healthcare in Indonesia. The authors' objective is to describe the evolution of the healthcare system in Indonesia. Community-based health service, called *puskesmas*, is the key of the healthcare service in the country. The World Health Organization estimated that 64% of all deaths in Indonesia are caused by noncommunicable diseases, which might relate to the mostly unorganized prehospital care system. The healthcare system in Indonesia continues to improve its care delivery and outcomes by an escalation in the number of health services.

KEYWORDS

Developing country; emergency care; health system; healthcare; Indonesia

Introduction

There have been several key changes to the Indonesian healthcare system since its independence in 1945 (Heywood and Choi 2010). As one of the less developed countries in the world, the evolution of the healthcare system in Indonesia might be similar to that of other developing countries (Shields and Hartati 2003). However, Indonesia has some unique characteristics. It is the fourth largest country after China, India and United States of America and the fourth most highly populated (United Nations 2014b). It is noted for its cultural diversity and its archipelago of 13,000 islands (Shields and Hartati 2003), as well as the political framework and government regime (Kristiansen and Santoso 2006). The development of a healthcare system in Indonesia might also be unique.

Indonesia comprises five main islands (Java, Sumatera, Kalimantan, Sulawesi, and Papua) with a land area of 1,922,570 km² and a broad waters area of 3,257,483 km² (Kementerian Kesehatan Republik Indonesia 2013b; Meliala, Hort, and Trisnantoro 2013). This large area is populated with more than 253 million people, with Java Island the most densely populated island. Java Island consists of West Java, Central Java, and East Java with the main cities being Jakarta and Jogjakarta (Kementerian Kesehatan Republik Indonesia 2013b; Meliala, Hort, and Trisnantoro 2013; Shields

and Hartati 2003). Data from the Indonesian Ministry of Health shows that there were 244,775,797 people living in Indonesia in 2012 with 50.3% men and 49.6% women (Kementerian Kesehatan Republik Indonesia 2013b). Data from the Ministry of Health also show that in 2012 the majority (66.1%) of people in Indonesia were between 15 and 64 years of age while 28.9% were under 15 years of age and 5.1% were greater than 65 years of age. There are 12 major ethnic groups; 41.7% of the population identify themselves as Javanese, the largest single ethnic group; and there are four major religious groups, with 86% identifying themselves as Muslim, the largest single religious group (United Nations 2014a).

Emergency care, both prehospital and in-hospital, is one of the major issues in Indonesia. In-hospital emergency care, which mostly occurs in the emergency department (ED) of the hospital, is important because the ED is the microcosm for other events of patient care in the hospital (Brown et al. 2013).

The purpose of this article is to describe the evolution of the healthcare system in Indonesia focusing on the healthcare facilities in Indonesia. The development of two types of healthcare facilities, *puskesmas* and hospitals, will be described. Specific issues about emergency care in Indonesia will also be discussed.

CONTACT Suryanto    School of Nursing and Midwifery, Monash University, 
Victoria, Australia; School of Nursing, Brawijaya University, Jalan Veteran, Malang, Jawa Timur, Indonesia.

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Government and Healthcare Management

For the operational function of the government, Indonesia has a five-tier government hierarchy. These tiers are national government, province, district (*kabupaten/regency* and *kota/city*), subdistrict (*kecamatan*), and village (*kelurahan/urban village* and *desa/rural village*; Kristiansen and Santoso 2006). Indonesia is currently divided into 33 provinces, 497 districts (399 regencies and 98 cities), 6,994 subdistricts, 77,465 villages (8,216 urban villages and 69,249 rural villages; Kementerian Kesehatan Republik Indonesia 2013b). In 1999, Indonesia initiated a decentralized government, including healthcare management, with authority and regulation at the provincial or district level. Nevertheless, central oversight by the Ministry of Health still delivers national guidelines and regulations to provide directions or instructions for health offices at the provincial and district level (Meliala, Hort, and Trisnantoro 2013).

Data from the Ministry of Health of Indonesia show that the number of poor people had decreased from 17.8% (39.3 million) in 2006 to 11.7% (28.5 million) in 2012 (Kementerian Kesehatan Republik Indonesia 2013b). Efforts have been made to improve healthcare outcomes among the poor by achieving targets toward the United Nations Millennium Development Goals, with major improvements in healthcare management being realized by the Indonesian government during the last four decades (Rokx et al. 2009). The major developments include decentralization in healthcare management, reformation of compensation for healthcare providers servicing remote areas, and increasing the distribution of midwives in rural and remote areas (Rokx et al. 2010). These actions have had a positive impact on healthcare outcomes based on the World Bank's report with infant mortality rates almost halved from 67.8 per 1,000 live births in 1992 to 34.0 per 1,000 live births in 2007 (Rokx et al. 2010). The mortality rate among children under 5 years of age has also undergone a similar downward trend from 97.4 to 45.0 per 1,000 (Rokx et al. 2009). The latest report from the World Health Organization (2016) shows that the mortality rate of children under 5 years of age and neonates in Indonesia was 27.2 per 1,000 live births. Compared with other Southeast Asian (SEA) countries, this number is below the average (30.8 per 1,000 live births), with the Maldives having the lowest number (8.6) and India (47.7), Myanmar (50.0), and Timor-Leste (52.6) the countries with the highest children under 5 years

of age and neonatal mortality rates (World Health Organization 2016).

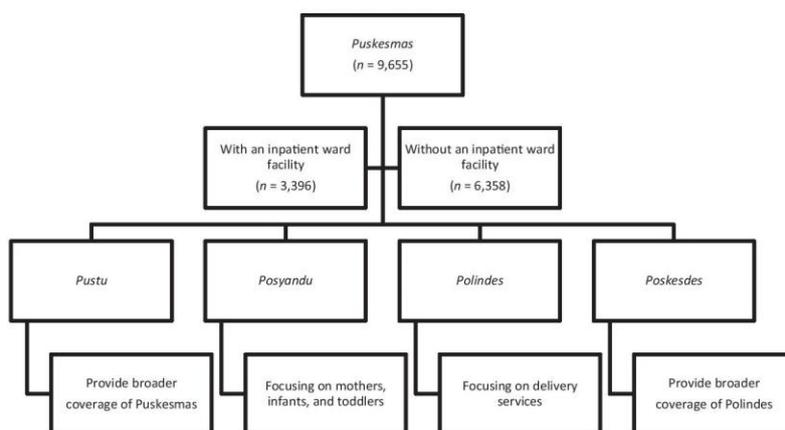
However, the World Bank's report also highlighted that the Indonesian healthcare system remains inefficient, unequal, and with low supervision rates where most people continue self-treatment, thereby creating a decline of health services utilization. This underutilization was especially evident after the 1990s financial crisis where medical doctors tended to provide services in private clinics where their distribution is unequal among the population (Rokx et al. 2009).

Implementation of a universal health insurance for Indonesian people, called *Badan Penyelenggara Jaminan Sosial*, was also part of the healthcare services development in Indonesia. The universal health insurance was launched on January 2014 and will cover all Indonesians by the end of 2019 (Indonesia strides toward universal health care 2014). The development of healthcare services in Indonesia is related to the increase of the total health expenditure. It had been increased from 2.0% of the gross domestic product (GDP) in 2000 to 3.0% in 2012 (World Health Organization, 2015). However, compared with other countries, this expenditure was below the average of health expenditure among other SEA countries and lower middle-income countries of 3.7% and 4.1% of GDP, respectively (World Health Organization, 2015). In Indonesia, 60.4% of health expenditure in 2012 was supported by the private sector and 39.6% was supported by the government (World Health Organization, 2015).

Telecommunication in health is one of the developing areas of healthcare service provisions in Indonesia. The Indonesian government launched a USD\$27 billion program for enhancing information and communications technology including telemedicine, which could help in delivering health services to the more remote areas (Tabor and Yoon 2015). The program is called the Indonesia Broadband Plan and will have been implemented from 2015 to 2019 to provide a broadband access to 80% of all rural institutions including government offices, schools and hospitals with the use of e-governance, e-education, and e-health (Tabor and Yoon 2015).

Healthcare Facilities

From 1945 to 1950, the healthcare system was focused on a curative program mainly concentrating on the



(Source: Kementerian Kesehatan Republik Indonesia 2015)

Figure 1. Organization of *Puskesmas*.

treatment of adults and mothers and infants (Heywood and Choi 2010). This system was in line with the situation in 1950 where the population was approximately 72 million and 1,200 medical doctors. The infant mortality rate at the time was 200 per 1,000 and the life expectancy was 48 years of age (Kristiansen and Santoso 2006). Traditional healers (*dukun*) and traditional medicine were commonly used within the community (Kristiansen and Santoso 2006). In the early 1950s, based on the Bandung Plan, the government initiated the integrative program of preventive and curative healthcare along with the establishment of *Pusat Kesehatan Masyarakat (puskesmas)* or community health centres at the subdistrict level with each centre staffed with medical doctors, nurses, and midwives (Heywood and Choi 2010). However, due to slow economic development and political instability, the concept of a *puskesmas* in every subdistrict was not achieved until 1968. The aim was for one *puskesmas* for 30,000 people and one *puskesmas pembantu (Pustu)* or subcommunity health center in each village covering around 3,000 people, with the full coverage of the system not achieved until 1988 (Kristiansen and Santoso 2006).

The centralized government under the regime of President Suharto increased the number and quality of health facilities in Indonesia, especially during the 1970s to 1980s when there was an establishment of district hospitals and subdistrict community health centers throughout the country. There was a corresponding decrease in infant mortality and an increased life expectancy (Kristiansen and Santoso 2006). However, during the Asian economic crisis in 1997, Indonesia

experienced economic hardship and it was estimated that 80 million Indonesians were below the World Bank defined poverty line (Shields and Hartati 2003). After the fall of Suharto's regime in 1998 due to reform triggered by massive corruption and lack of transparency (Kristiansen and Santoso 2006), there was the first democratic election. Decentralization of the government was established in 2001 where authority was given to provincial and district governments to deliver services to the community, including health (Abdullah et al. 2012; Heywood and Choi 2010). This decentralization reduced administrative bureaucracy and led to more efficient public services (Kristiansen and Santoso 2006). Even though funding from the central government decreased, local government expenses were increased using local tax revenues of business activities and local resources (Kristiansen and Santoso 2006).

Each *puskesmas* is in conjunction with not only a *Pustu*, but also a *Pondok Bersalin Desa (Polindes)* or village delivery center, *Pos Pelayanan Terpadu (Posyandu)* or integrated health post, and *Pos Kesehatan Desa (Poskesdes)* or village health post (see Figure 1; Abdullah et al. 2012). Each *puskesmas* coordinates the main service for the preventive and curative programs including antenatal and postnatal care, immunization, family planning services, nutrition and sanitation consultations, and dental service. Some *puskesmas* have inpatient facilities (*puskesmas* with beds), whereas a *pustu* increases the quality and outreach of a *puskesmas'* function at the village level (Abdullah et al. 2012; Kristiansen and Santoso 2006). *Polindes* is a village health center that is staffed with midwives and used mainly for delivery services. *Posyandu* is one of the

community empowering activities at the village level that focuses on providing basic healthcare services for mothers, infants, and toddlers (Kementerian Kesehatan Republik Indonesia 2013b). *Poskesdes* is another of the community-empowering activities at village level that is similar to *Polindes* but has broader activities that are not only for maternal and infant services, but also for health services in general, including health surveillance for nutrition, environment, emergency, and disasters (Kementerian Kesehatan Republik Indonesia 2013b).

The development of hospitals in Indonesia also has unique characteristics. There are two hospital categories, which are based on services provided and on patient management (Republik Indonesia 2009). The description of each category is depicted in Table 1.

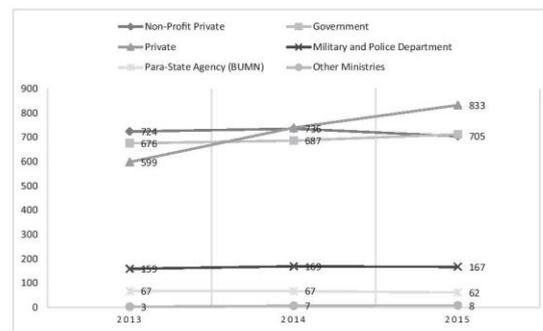
The Indonesian government also classifies the general and specialty hospitals into several classes (A, B, C, D) based on facilities and the services provided by the hospitals. Class A hospital is the highest level of the category. This category was established for referral purposes (Republik Indonesia 2009).

In addition, there are several classes of inpatient wards in each hospital, including Class III inpatient wards, Class II inpatient wards, Class I inpatient wards, VIP inpatient wards, and pavilion inpatient wards. However, there is no general regulation from the government for the criteria of facilities for each inpatient ward class. Therefore, every hospital has its own standard for each class, meaning that the standard of Class III inpatient wards in a certain hospital differs from Class III inpatient wards at another hospital. Nevertheless, the common standard is that a Class III facility is

Table 1. Hospital type in Indonesia.

Category	Hospital type	Characteristics
Based on service	General hospital	The hospital provides health services to all fields and all type of diseases
	Specialty hospital	The hospital provides health services for a particular disease or particular field based on branch of science, age, body system, disease, or other specialties
Based on management	Public hospital	The hospital is managed by the central government, local government, or other body corporates for nonprofit purposes
	Private hospital	The hospital is managed by a corporate body for profit purposes

Source: Republik Indonesia (2009).



(Source: Kementerian Kesehatan Republik Indonesia 2015)

Figure 2. The development of hospitals in Indonesia from 2013 to 2015.

the lowest class and has the least facilities whereas the pavilion class is the highest class.

Data from the Indonesian Ministry of Health show that the number of hospitals has increased from 1,079 in 2008 to 1,295 hospitals in 2012 (Kementerian Kesehatan Republik Indonesia 2013b). The increase in the number of hospitals in Indonesia had been concomitant with the increase in bed occupancy, which increased from 128,750 in 2008 to 203,768 in 2012. Details of the hospital development in Indonesia can be seen in Figure 2.

The most current data from Indonesian Ministry of Health also shows significant growth in hospital numbers, with 1,764 general hospitals and 528 specialty hospitals in 2014 (Kementerian Kesehatan Republik Indonesia 2014). The details of each category can be seen in Table 2.

The development of the healthcare system from 1945 to the present time has shifted from a curative focus to one that offers preventive as well as treatment programs. It has operated under centralized and decentralized government structures and has seen the development of two major healthcare facilities, the

Table 2. Indonesian public and private hospitals in 2015.

Hospital type	Owner	General hospitals	Specialty hospitals	Total
Public hospital	Ministry of health	14	19	33
	Local government	621	59	680
	Military/police department	162	5	167
	Other ministry	6	2	8
Private hospital	Private nonprofit	538	167	705
	Private	553	280	833
	State-owned enterprises	55	7	62
Total		1,949	539	2,488

Source: Kementerian Kesehatan Republik Indonesia (2016).

puskesmas and the general and specialist hospitals, which are publically or privately owned.

Another report from the World Health Organization (2014) shows that the ratio of hospitals in Indonesia to population in 2013 was 0.4 per 10,000 people. Compared with other countries, the ratio is similar to Nepal but higher than Bangladesh, 0.2 per 10,000 people. Other SEA countries, Myanmar and Thailand, had higher ratios of hospital to population, 0.6 and 1.8 per 10,000 people, respectively (World Health Organization 2014).

Nurses accounted for the highest number among healthcare providers in Indonesia, 233,910 (34.6%) of whom 73,311 staff a *puskesmas* and 147,264 of them staff hospitals (Kementerian Kesehatan Republik Indonesia, 2015). A majority of those nurses have a diploma in nursing qualified or below; as an example, there were 26,056 (92.3%) diploma of nursing qualified or below and 2,180 (7.7%) bachelor of nursing qualified nurses in East Java province (Dinas Kesehatan Provinsi Jawa Timur 2013). Midwives accounted the second largest human resources in health in Indonesia, at 111,736 (12.7%; Kementerian Kesehatan Republik Indonesia, 2015). To measure the minimum standard of competencies for nurses and midwives, new graduates of both professions must undertake a national competency exam (Direktur Jenderal Pendidikan Tinggi, 2013). Medical doctors were the third largest healthcare workers in Indonesia, 101,615 (11.6%) (Kementerian Kesehatan Republik Indonesia, 2015) and the competency national exam for medical doctor graduates has been in place since 2004 (Republik Indonesia, 2004). The small portions of other healthcare providers in Indonesia include pharmacists, public health officers, biomedical technicians, medical technicians, dieticians, physiotherapists, psychologists, and traditional healthcare providers (Kementerian Kesehatan Republik Indonesia, 2015).

Emergency Care in Indonesia

Emergency care can be discussed from two perspectives, prehospital and in-hospital care. In terms of prehospital emergency care, there is no system of ambulance service or patient retrieval in Indonesia (Pitt and Puspongoro 2005; Puspongoro 2003). This situation may influence the mortality rate in Indonesia, especially accident-related mortality such as death

caused by injury, as well as threatening medical cases such as cardiac arrests. The World Health Organization (2011) estimated that 64% of all deaths in Indonesia are caused by noncommunicable diseases with injuries being the fourth largest cause (9%). Current data from the World Health Organization show that the road traffic mortality rate in Indonesia was 15.3 per 100,000 people, it was below the average among SEA countries (17.5). Compared with other SEA countries, Thailand had the highest road traffic mortality rate with 36.2 and Maldives had the lowest rate with 3.5 per 100,000 people (World Health Organization 2016).

The awareness of the importance of an emergency medical system was raised in 1969 by the Indonesian Surgeons' Association, when they recognized that no prehospital system was dealing with 70% of trauma mortality resulting from traffic accidents (Pitt and Puspongoro 2005). A pilot ambulance project was established in 1972 but due to financial problems it was shelved. Further development occurred in the late 1980s or early 1990s when municipal offices from seven cities in Indonesia (Jakarta, Palembang, Yogyakarta, Surabaya, Makassar, Malang, and Denpasar) introduced the 118 Emergency Ambulance Service (Pitt and Puspongoro 2005). Then, the ambulance system was expanded to 18 cities in Indonesia. This development was in conjunction with the introduction of the Advanced Trauma Life Support course in 1995 and the increase in government awareness of prehospital care. The government launched the Safe Community Program in 2000, a program that aimed to provide health care for the safety and health of citizens in both rural and urban areas (Puspongoro 2003).

From those 18 cities implementing the 118 emergency services, Jakarta, as the capital city of Indonesia, had the most advanced development of prehospital care services. In 2005, there were 26 functioning ambulances and 12 motorcycles that provided prehospital services. The service received 50–70 calls per day in Jakarta where the emergency vehicles were positioned in 10 strategic locations (Pitt and Puspongoro 2005). Each ambulance was crewed by two paramedics and equipped with oxygen, defibrillator, ventilator, spinal board, and splints, whereas the motorcycles were equipped with a basic resuscitation kit to enable a paramedic to stabilize a patient while waiting for an ambulance (Pitt and Puspongoro 2005).

Even though the number of ambulance was increased to 32 vehicles in 2010 (First REIT 2010),

the number has dropped back to 21 (Dinas Kesehatan Provinsi DKI Jakarta 2014). The system was not able to cover all of the Jakarta area and hence the average response time varied from 30 min up to 1 hr. The system also struggled with financial issues, which also decreased its efficiency (First REIT 2010).

In 2010, based on Governor Law No. 144 of 2010, 118 emergency services in Jakarta were converted into *Ambulans Gawat Darurat Dinas Kesehatan Provinsi DKI Jakarta* (AGD DINKES) with the 118 call center becoming a Public Service Agency or *Badan Layanan Umum* under the provincial government (Dinas Kesehatan Provinsi DKI Jakarta 2014). In 2014, there are 239 staff in the AGD DINKES, consisting of 255 nongovernment employee staff and 14 government employees including healthcare providers and non-health workers who provide free ambulance services for the general public and commercial services such as standby for special events such as sport, music or other gatherings (Dinas Kesehatan Provinsi DKI Jakarta 2014).

Due to insufficient prehospital services provided by the government, there are now several hospitals in Jakarta, mainly private hospitals, which provide their own ambulance service, including air evacuation services (First REIT 2010). This is a fee-for-service arrangement that may be rebatable through the private health fund or self-funded by the patient of the private hospitals. Some nongovernmental organizations are able to provide prehospital care in Jakarta, for example Medic One, a service based on membership for middle- to upper-class people in Central, South, and West Jakarta (First REIT 2010). Based on this situation, the other cities that previously provided the 118 emergency services were in a difficult position with no other options, such as in Malang, where the 118 call center is no longer available. However, there is no published literature covering the current situation of prehospital care services in Indonesia.

The development of prehospital care mostly occurred in Jakarta, the capital city of Indonesia. In March 2013 DKI Jakarta Province launched the 119 Emergency Call Centre, part of the *Sistem Penanggulangan Gawat Darurat Terpadu* (SPGDT) program or Comprehensive System of Emergency Management (Kementerian Kesehatan Republik Indonesia 2013a). The SPGDT program is a Ministry of Health program that was initiated in 2000 in order to promote prehospital emergency care, in-hospital emergency care, and interhospital referral using cross-program and

multisector collaboration (Kementerian Kesehatan Republik Indonesia 2016). The most current development of prehospital care services in Indonesia was the launch of Emergency Service 119 at a national level in July 2016. The 119 medical emergency service is now available in 27 locations in Indonesia with the establishment of the National Command Centre in Jakarta and several Public Safety Centers in every city implementing the 119 medical emergency service (Dzulfiqar and Riza 2016).

In terms of in-hospital emergency care, there are two pathways for patients to obtain care in the ED, first is presenting directly to the ED of the hospital or being referred from another ED (First REIT 2010). The patients can come directly to ED by ambulance, private car, public transport, or, in the case of traffic accident, picked up and transported by a passerby. Depending on the facilities within an ED at the level of the hospital, patients can be treated straight away or transferred into a higher-level ED at another hospital (First REIT 2010). Based on the Indonesian Ministry of Health law No. 856 of 2009, there are four levels of ED in Indonesian hospitals; level IV ED is the highest level and becomes the minimum standard of a Class A hospital, a level III ED is the minimum standard of a Class B hospital, a level II ED is the minimum standard of a Class C hospital, and a level I ED is the minimum standard of a Class D hospital (Kementerian Kesehatan Republik Indonesia 2009).

There is no national triage system in Indonesia, and each hospital applies a varying level triage system with a four-level triage system most commonly used; however, the effectiveness of the triaging systems has never been evaluated (Rochana 2013). In Sanglah General Hospital, the largest hospital on Bali Island, with the most famous tourist attractions in Indonesia, there is no systematic triage system to manage the patients (Brown et al. 2013). Even though triage doctors are more available than triage nurses, the implementation of a triage system in Indonesia is commonly neglected and inconsistent (Rochana 2013). Thus, it is not surprising that even though the triage skill is at a moderate level, triage knowledge among ED nurses in Indonesia is at low level (Fathoni, Sangchan, and Songwathana 2010).

Conclusion

The healthcare system in Indonesia continues to improve its care delivery and outcomes with many

regulations issued to increase the health status of the people. The development of the healthcare system can be seen from the escalation of quantity and quality of healthcare facilities in both hospitals and *puskesmas*. The implementation of a universal health insurance scheme should enhance the coverage of health services for all Indonesians, especially in the more rural areas, and may improve overall healthcare services for the poor. The cultivating of the information technology for use in healthcare in Indonesia may enhance health outcomes, especially for the people in the rural and remote areas of the country. The establishment of SPGDT is projected to enhance the emergency care services in Indonesia. Establishment of the 119 emergency medical service in 27 cities across Indonesia may enhance the quality of prehospital care to those cities. These ongoing improvements are related to the funding of the systems, especially after the establishment of government decentralization in the 1990s. The decentralized model also influences how provincial governments manage health workforces, as well as the central government's regulations for healthcare provider distributions.

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2.3 Financing Healthcare in Indonesia

The second paper describes the organisation of health finance in Indonesia and how it compares with other Southeast Asian countries. It starts with an explanation of the development of the health insurance system followed by the implementation of the current universal health insurance programme, BPJS. Ambulance services for prehospital care, however, are not covered by the BPJS. The BPJS only covers the ambulance service for referral purposes between health facilities already affiliated with the BPJS (Republik Indonesia, 2011). Therefore, fee for prehospital ambulance service is self-funded and because ambulance services tends to be costly for most people in Indonesia, the majority of patients are brought to hospital EDs via private vehicles or public transport (Haedar, 2011). Without using an ambulance for prehospital transport, the patients' condition may worsen due to the type and timing of transport to the ED. Based on this situation, it is essential to investigate how to improve the prehospital care system in Indonesia so that the community can access ambulance services in emergency situations.

Financing Healthcare in Indonesia

Suryanto, V Plummer and M Boyle

Abstract

Introduction: There have been two major transitions for healthcare in Indonesia: the implementation of government decentralisation and universal health insurance. A universal public health insurance called Badan Penyelenggara Jaminan Sosial (BPJS) was launched in January 2014 and aims to cover all Indonesian people.

Objective: The objective of this paper is to discuss the funding of healthcare in Indonesia through a comparison with other South East Asian countries.

Methodology: A search for relevant literature was undertaken using electronic databases, Ovid Medline, ProQuest Central, and Scopus from their commencement date until December 2015. The grey literature from the Indonesian government, the WHO's and World Bank's website, has been included.

Results: There were nine articles from Ovid Medline, eight from ProQuest Central, and 12 from Scopus that met the criteria. Seventeen articles were duplicates leaving 12 articles to be reviewed. Nine documents have been identified from grey literature.

Discussion: Most people in Indonesia sought health services from the private sector and were out-of-pocket financially or did not receive the required care. The private sector delivered 62.1% of health services compared to 37.9% by the government. Despite some inappropriate use of previous health insurance, the BPJS is expected to have improved management and will cover all citizens by the end of 2019.

Conclusion: Indonesia has undergone a series of changes to health system funding and health insurance. There are lessons that can be learnt from other countries, such as Thailand, Cambodia, and Vietnam, so that Indonesia can improve its health funding.

Abbreviations: BPJS – Badan Penyelenggara Jaminan Sosial.

Key words: financing; funding; health insurance; healthcare; health system; Indonesia.

Suryanto

PhD Candidate
School of Nursing and Midwifery
Monash University, Victoria, Australia.
School of Nursing
Brawijaya University, Malang, Jawa Timur, Indonesia.

A/Professor Virginia Plummer

School of Nursing and Midwifery
Monash University, Victoria, Australia.

Dr Malcolm Boyle

Department of Community Emergency Health and
Paramedic Practice
Monash University, Victoria, Australia.

Correspondence:



Introduction

The development and modernisation of the healthcare system in Indonesia is in a critical stage as the country is attempting to improve health outcomes for the poor as well as succeed in reaching the United Nations Millennium Development Goals. [1] There have been two major transitions for healthcare in Indonesia; the implementation of decentralisation of government authorities and universal health insurance coverage. [1] Decentralisation of government authorities was initiated in 2001 as a result of the fall of the Suharto regime [2] and this led to the increased authority of provincial governments to manage and organise health services for the community, including managing health funding. [3,4]

A new system of health insurance called *Badan Penyelenggara Jaminan Sosial* (BPJS) or universal health insurance coverage was launched on January 1, 2014 [5,6] and it is

estimated that it will cover all people in Indonesia by the end of 2019. [6] The achievement of 100% coverage in the next few years is remarkable given that only 63% of Indonesian people were covered by health insurance under governmental or private schemes in 2012 [7] and only 14% in 2000. [8] The people covered by health insurance in 2000 were mostly civil servants and their family members who were covered by Asuransi Kesehatan (Askes) and employees in the formal sectors who were covered by Jaminan Sosial Tenaga Kerja (Jamsostek). [8]

In this article the funding of healthcare in Indonesia will be analysed and compared with other South East Asian countries. There are three major issues which will be covered; the development of health insurance, the implementation of the universal health coverage and finally the role of government and the private sector in healthcare funding.

Methodology

Design

A review of medical related electronic databases, Indonesian Government websites and international organisation publications to examine healthcare funding in Indonesia was undertaken.

Process

A search was undertaken using three electronic databases, Ovid Medline, ProQuest Central, and Scopus from their commencement date until the end of December 2015. The search strategy used the following keywords: 'financing', 'funding', 'health insurance', 'healthcare', 'health system', and 'Indonesia'. The search used the keywords individually and in combination. The Indonesian government, the WHO's website, and World Bank's website were also searched for information about Indonesian health funding.

Articles and documents were included if they reported on the funding of healthcare in Indonesia, healthcare funding management in Indonesia, and health insurance in Indonesia either written in English or Bahasa Indonesia. Articles and documents were excluded if they were commentaries, letters to editors or if full-text was not available.

Results

There were 5,516 articles identified overall with 1,016 articles identified in the Ovid Medline, 1,378 in ProQuest Central, and 3,122 in Scopus. Further screening for relevance was undertaken based on the title and abstract. This resulted in 21 articles from Ovid Medline, 18 from ProQuest Central, and 31 from Scopus retrieved for further review. Those 70 articles were then reviewed based on inclusion and exclusion criteria. Based on the criteria, there were nine articles from Ovid Medline, eight from ProQuest Central, and 12 from Scopus with 17 of them duplicated leaving 12 articles to be reviewed. There were nine documents identified on the Indonesian government, the WHO, and World Bank's websites for inclusion in the review.

Discussion

The development of health insurance in Indonesia and other, similar countries

Indonesia has implemented one health insurance scheme specifically for the poor through the establishment of the BPJS program in early 2014. The poor and near poor are approximately 50% of the population and became the focus of the government response. This group is vulnerable to both economic and health shocks which can push the household into poverty. [1] In 2012, half of the population was covered by a government health insurance called Jamkesmas (50.4%). [7] Details of the number of people covered by the different types of health insurance available in 2012 can be seen in Table 1.

Table 1: Coverage of Health Insurance in Indonesia in 2012

TYPE OF HEALTH INSURANCE	MEMBERS	PERSONS
<i>Askes</i>	Civil servants, pensioners	17,274,520
Military and police health insurance	Military and police officers	2,200,000
<i>Jamkesmas</i> (by national government)	Poor people	76,400,000
<i>Jamsostek</i>	Formal sector workers	5,600,000
<i>Jamkesda</i> (by regional government)	Poor people	31,866,390
Corporate insurance	Private members	15,351,352
Commercial health insurance	Private members	2,856,539
Total		151,548,981

Source: [7] Simmonds A, Hort K. Institutional Analysis of Indonesia's Proposed Road Map to Universal Health Coverage. Health Policy and Health Finance Knowledge Hub. 2013; 33: 1-13.

During the regime of President Suharto, only civil servants, soldiers, and formal sector workers, such as State-Owned Enterprise workers, were covered by health insurance. [9] The health insurance for civil servants was called *Askes* and for formal sector workers was called *Jamsostek*. [8] These two health insurances were the most commonly used insurances and had the largest membership in Suharto's era. However, there were several changes to the health insurance program, which were initiated by the Indonesian government along with the fluctuations of the political situation and the development of Indonesia itself.

Askes was introduced in 1968 and had been compulsory for civil servants. A fixed monthly deduction of 2% of salaries had to be used as a premium for the health insurance. [10] *Askes* not only covered the health insurance for civil servants, armed forces and their families, but also pensioners were covered for comprehensive health services provided by public health facilities. [10] Similar to *Askes*, *Jamsostek* was launched in 1992 and covered employees in formal sectors [9] with a higher premium than *Askes*, 3% of their monthly salary for single employees and 6% of the monthly salary for married employees. [10]

Kartu Sehat, introduced in 1994 and ceased in 2004, was a health insurance program targeting poor households in order to reduce the inequality and access gaps for healthcare services. [11] In response to the Asian economic crisis and as a part of *Jaring Pengaman Sosial (JPS)* or the social safety net program in Indonesia, the insurance was reintroduced in 1998. [9,11,12] The insurance provided health services, including outpatient and inpatient care, contraception, prenatal care, and delivery for poor people. [12] However, based on the study by Sparrow, [12] a large amount of the insurance went to richer quintile households, not the poor, since most of the targeted people were in rural areas with those poor rarely using the card due to a lack of access to health facilities. Another study showed that there was a low utilisation of the insurance due to the lack of public facilities. [11]

Asuransi Kesehatan Keluarga Miskin (Askeskin), was in place from 2004 to 2008, and was a program which was a substitute for the *Kartu Sehat* program. [13] Even though *Askeskin* had been successfully providing coverage for the poor, based on a socioeconomic survey in 2005 and 2006, the insurance was used by those other than the poor. [13] This problem was due to the 'open system' meaning eligible patients used self-identity as poor people, rather than identification by authorised persons or the health service, which led to misuse of the system. [14]

Jaminan Kesehatan Masyarakat (Jamkesmas) is another health insurance for poor people which substituted *Askeskin* and commenced in 2008. [9] Compared to *Askeskin*, *Jamkesmas* had a higher coverage rate with 76 to 86 million Indonesians targeted at a total cost of 8.29 trillion rupiahs, about US\$703 million. [7,9] This expansion was due to increasing the coverage to include the near-poor. [15] The outcome was similar to other health insurance for the poor, in that *Jamkesmas* was under-utilised. [7] There were several factors influencing the underutilisation of the *Jamkesmas* including a lack of understanding of the program, the remote areas where the poor people lived meant that the services could not reach the targeted people, several other expenses for medicines were not covered by the insurance so the people still had to spend their own money for care, and finally and potentially most significantly, the stigma of perceiving and self-identifying as poor. [7]

Despite the wide coverage of the *Jamkesmas* national program, there were people who were not categorised as poor or near poor by the national criteria, thus several regional governments provided *Jaminan Kesehatan Daerah (Jamkesda)*, which was managed by regional governments, to expand the coverage of *Jamkesmas*. [9] In spite of the underutilisation of the programs, *Jamkesmas* and *Jamkesda* had covered 76 million (32% of total population) and 33 million (14% of total population) people respectively by the end of 2011. [9] In order to enhance the *Jamkesmas* coverage for maternity services, in 2011, the Ministry of Health launched the *Jaminan Persalinan (Jampersal)* program which provided free maternal care including ante natal care, delivery service, postnatal care, neonatal care and contraception. [16]

While Indonesia started health insurance for the poor in 1994, Vietnam commenced a similar program in 1999, called the 'free card' program. [17] However, the program relied on local funding which led to the local government encountering several obstacles, especially where the poverty rate of the province was high, and this led to the low coverage of the population by this insurance. Therefore, in 2003, the new health insurance for the poor called Health Care Fund for the Poor (HCFP) was introduced. [17] In 2006, 20% of the Vietnamese population, 14.5 million, were covered by the HCFP, but similar to Indonesia in regard to the misuse of the insurance, in Vietnam 3.5 million (40%) people covered by the program were ineligible and 8.4 million eligible people were not covered by the program. [17] It is common that health services have a pro-rich bias. The experience in Indonesia and six other countries in Asia

except Hong Kong, Malaysia, Sri Lanka, and Thailand was that the poor get far less advantages from services. [18] Forty-one percent of the richest in Indonesia benefited from health services while 7% and 5% of the poor benefited from both outpatient and inpatient services respectively. [18]

Compared to Thailand, Indonesia has also been slow to implement health insurance for the poor. In Thailand, the first health insurance for the poor, the Medical Welfare Scheme (MSW), was established in 1975 and was then followed by the establishment of health insurance for government and state enterprise employees called the Civil Servant Medical Benefit Scheme (CSMBS) in 1978. [19] On the other hand, the Indonesian government, initially, focused on health insurance for government employees instead of focusing on health insurance for the poor. The health insurance for government employees, Askes, was established in 1968, [10] while the first health insurance for the poor, Kartu Sehat, was established in 1994, [11] more than 20 years after.

The implementation of BPJS

In Indonesia the concept of BPJS is mutual assistance which is the program that will unify all health insurance schemes for civil servants, police, formal workers, and for the poor. [7] With respect to the premiums, based on the President's Regulation of the Republic of Indonesia (*Peraturan Presiden*), there are two categories of BPJS participants, Indonesian people without government support and Indonesian people with government support. [20] Based on this regulation, the government will give support to the poor for their health insurance premiums and others will self-fund or salary package via their employers.

Simmonds and Hort [7] argue that there are five major challenges in implementing the BPJS: the fragmented health financing system, decentralisation, demographic transition, high out-of-pocket spending, and low levels of spending on health by the central government. However, those challenges were met by the government through key regulations. The most current law, No. 111/2013, describes all aspects of the BPJS including types of participants, process of registration, premium fees, payment systems, service coverage and evaluation process. [20] However, as Indonesia is a lower-middle income country and has more than 250 million people with five-year target (end of 2019) to cover all citizens, it is a big challenge for the Indonesian government to implement universal health coverage.

Several lessons can be learnt from Thailand. In Thailand the universal health coverage called Universal Coverage Scheme (UCS) was implemented in April 2001 [19] and

covered 75% (47 million) of the population by 2003. [18,19] The government subsidy, from US\$ 1 billion in 2003 to US\$ 1.3–1.5 billion in 2004–2009, has influenced the successful implementation of the UCS in Thailand. [18] This success can be seen from the fact that the number of uninsured people had decreased sharply from 54.5% in 1996 to 29.8% in 2001. [19] Out-of-pocket payment is still dominant among low-middle income countries, [17] but the implementation of UCS in Thailand had reduced the out-of-pocket expenditure from 33% in 2001 to 18% in 2008 while increasing the government subsidy from 50% to 67% of total health expenditure. [18]

The role of Governments in healthcare funding

The decentralisation of government authorities in Indonesia, which commenced in 2001, has significantly impacted the health system. Local governments have responsibility for planning, financing and distributing health services yet the central government has retained overall regulatory authority. [21] Every level of health office has their own roles. The provincial level health office main roles are training and coordination, the district-level health office has responsibility for delivering health services and allocating resources, while the sub-district level mainly focuses on providing basic health services in the Puskesmas, a type of community health centre. [1]

The implementation of a decentralised health system has made health financing more complicated as local governments could not implement all services arising from the mandatory universal health insurance from the central government. [1] Local governments had to apply a national health insurance scheme while also implementing decentralised health insurance and this was difficult to realise. Implementing both health insurance schemes was not only confusing for healthcare providers, but also for patients. As a result, almost half of the sick and injured in Indonesia sought health services from the private sector and were out-of-pocket, even though the government's principle, *Alma Alta*, is to provide universal access to primary care for all Indonesians. [1] A similar situation occurred in Cambodia where the country implemented health service decentralisation in 1994 and experienced similar obstacles to Indonesia. Lack of role clarity between the Provincial Health Departments and Operational Health District was one of the major problems resulting in poor integration. [22]

Expenditure by sector and country type

Since most Indonesians seek health services from the private sector it is not surprising that the majority of health

expenditure in Indonesia is contributed by the private sector rather than the government. In 2011 the contribution was 62.1% by the private sector compared to 37.9% by the government [23] even though the government had increased funding of health as a proportion of total government expenditure, from 4.5% in 2000 to 6.2% in 2011. [23] However, this proportion is still below the average among South-East Asian countries, which was 7.3% in 2000 and 8.7% in 2011. The proportion of Indonesian health expenditure was 7.1% in 2000 and 8.1% in 2011. [23] Nevertheless, the health expenditure had been increased from 2.0% of Gross Domestic Product (GDP) in 2000 to 2.9% in 2011. Compared to other South-East Asian countries the proportion of health expenditure in Indonesia in 2011 was higher than Myanmar, 1.8% of GDP, but lower than Thailand and Timor Leste, 4.1% and 4.6% respectively. [23] The detailed comparison of health expenditure in Indonesia and selected global societies can be seen in Table 2.

will focus on public health services including primary health services (Puskesmas) and public hospitals. [6] A study evaluating the impact of the universal health insurance in Thailand shows that the implementation of the insurance scheme may increase the use of district hospitals by 2.3% and decrease the use of provincial hospitals by 4.1%. [18] This article may be potentially limited by the lack of accurate and current information about the Indonesian Government financial status and other literature about the financing of government authorities and the health system in general. There is also a lack of current documented government and health services funding from similar countries thereby making accurate and current comparisons difficult.

Conclusion

Many regulations have been issued in order to increase the health status of the Indonesian people, especially the poor, by rapid changes to health insurance during the last

Table 2: Comparison of Indonesian Health Expenditure and Other Countries in 2011

CHARACTERISTICS	TOTAL EXPENDITURE ON HEALTH AS % OF GDP	GENERAL GOVERNMENT EXPENDITURE ON HEALTH AS % OF TOTAL HEALTH	PRIVATE EXPENDITURE ON HEALTH AS % OF TOTAL HEALTH EXPENDITURE	GENERAL GOVERNMENT EXPENDITURE ON HEALTH AS % OF TOTAL GOVERNMENT EXPENDITURE
Indonesia	2.9	37.9	62.1	6.2
South-East Asian Countries (average)	3.7	36.7	63.3	8.7
Lower-Middle Income Countries (average)	4.4	36.6	63.4	8.1
Global (average)	9.1	58.8	41.1	15.2

Source: [23] World Health Organisation. World Health Statistics 2014. Available: <http://www.who.int/gho/publications/world_health_statistics/2014/en/> (Accessed 14/05/15)

Even though the Gross National Income of Indonesia increased from US\$150,317 million in 2000 to US\$822,696 million in 2011, [24] health expenditure was still below 3% of GDP in 2011. [23] In addition to this significantly below average government health expenditure, a large part of the government budget is for healthcare provider salaries. However, more than 67% of Puskesmas physicians were engaged in dual practice, in both the private and public sectors, [25] which may lead to an inefficient use of public funds for health. Even though Indonesians have utilised more private services than public, with the implementation of universal health coverage (BPJS) it is expected that there will be a shift from the private sector to public health services. [1] This is because the universal health insurance

two decades. The current health insurance scheme (BPJS) is projected to provide access to healthcare services for all citizens in Indonesia by the end of 2019. It is believed that BPJS will be well implemented through the introduction of legislation. The most recent Indonesian government is likely to have new perspectives and ideas regarding health funding which could change policies, procedures and regulations about health insurance and this may influence both health services provision, insurance and funding arrangements, thereby improving outcomes for people seeking health services. Lessons can be learnt from other countries, such as Thailand, Cambodia, and Vietnam.

Competing Interests

The authors declare they have no competing interests.

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2.4 Health Workforce in Indonesia

As mentioned, this research focused on human resources in prehospital care. However, at the time of the study, there was no specific prehospital care provider in Indonesia, such as paramedics like in Australia or Emergency Medical Technicians (EMTs) in the USA. Instead, nurses working in hospital EDs and *puskemas* staff the ambulances along with a driver. The following paper discusses the health workforce in Indonesia and shows that nurses account for the highest number of healthcare workers in the country. However, nurses' undergraduate preparation is focused on providing care in-hospital, where most nurses will be employed. There is little undergraduate curriculum content and no specific postgraduate courses for nurses staffing an ambulance. Therefore, it is essential to investigate nurses' abilities to work as ambulance nurses. A detailed description of human resources in the Indonesian health sector is provided in the following paper.

Healthcare Workforce in Indonesia

Suryanto, M Boyle and V Plummer

Abstract

Introduction: Imbalanced distribution of healthcare providers between urban and rural areas is one of the difficulties facing health service provision in Indonesia. Several regulations have been made by the government to solve the problem. The objective of this paper is to describe the provision of human resources for healthcare services in Indonesia.

Methodology: A review of medical related electronic databases, CINAHL and Ovid MEDLINE, was undertaken from their commencement date until the end of January 2017. The grey literature from the Indonesian government, the World Health Organisation and the World Bank websites was also searched.

Results: There were 92 articles identified from the CINAHL and 222 articles from the Ovid MEDLINE databases. Five articles were included from the two databases and five documents from grey literature with ten articles to be reviewed.

Discussion: Nurses and midwives account for the largest proportion of healthcare providers in Indonesia. The ratio of healthcare providers in Indonesia is lower than the average of South-East Asian and other lower-middle income countries. More than half of the healthcare providers in Indonesia provide care in community health centres. Several regulations have been proclaimed to improve the imbalanced proportion of healthcare providers across the country.

Conclusion: Indonesia continues to develop strategies towards successful distribution of healthcare providers across the country. A study investigating the impact of the programs reducing the imbalanced distribution of healthcare providers on health outcomes is essential for Indonesia.

Key words: healthcare providers; health workforce; human resources; developing country; Indonesia.

Suryanto

School of Nursing and Midwifery,
Monash University,
Frankston, Victoria, Australia.

School of Nursing,
Brawijaya University,
Malang, Jawa Timur, Indonesia.

Malcolm Boyle

School of Medicine,
Griffith University,
Southport, Queensland, Australia.

Virginia Plummer

School of Nursing and Midwifery,
Monash University,
Frankston, Victoria, Australia.

Peninsula Health,
Frankston, Victoria, Australia.

Correspondence:

[Redacted contact information]

Introduction

Similar to other lower-middle income countries such as India and Pakistan, there is inequality in numbers and distribution of healthcare providers in Indonesia. [1] This inequality is due to the wide geographic distribution of its various health facilities and the health status of the community throughout the country. [2] With more than 255 million people living in Indonesia, [3] most doctors serve in urban areas and yet only 20% provide services in rural areas, where 70% of Indonesians live. [1] In the late 1960s, in order to minimise the imbalanced distribution between urban and rural areas, there was a government regulation of a deployment policy for all medical school graduates including doctors, midwives, and nurses to become civil servants. As a result it was compulsory to serve at least two years in a remote area, or three years in a rural area, or five years in more urbanised areas. [4] However, due to the fiscal crisis, those policies were discontinued and changed into the Pegawai Tidak Tetap

(PTT) program, or contract staff. It was compulsory for newly graduated doctors to be contracted staff and to provide healthcare in remote areas. [4] However, due to dissatisfaction among medical graduates, which was mainly because only 40% of them were recruited as civil servants, the PTT program was terminated in 2007, [4] but then was reintroduced with a new scheme, which has been in place until the recent years.

The imbalanced proportion of healthcare providers remained until the implementation of Indonesia's health policy, "Healthy Indonesia 2010", which had a positive influence in improving the healthcare provider distribution in Indonesia, especially in remote and rural areas. [4] This health policy increased the community's interest in pursuing a healthcare profession as a career. In 2008, there were about 10,000 midwives and 34,000 nurses graduating every year from 465 and 682 midwifery and nursing schools respectively; whereas, the medical school received 80,000 applications for new students, which only had a 4,700 capacity. [4] This demand was associated with an increasing number of private institutions which was greater compared to state institutions, with most doctors graduating from private education institutions. However, the graduates were mostly considered less-qualified due to lack of government oversight of the private institutions' education process. [4]

The decentralisation implemented by the Indonesian government influenced the distribution of healthcare in the country. Decentralisation allows for a more efficient recruitment system of healthcare providers for rural areas because the recruitment can be based on local needs and priorities. [4] This article describes the provision of human resources for healthcare services in Indonesia focusing on the distribution public and private health workers.

Methodology

Design

A review of medical related electronic databases, Indonesian Government websites and international organisation publications to examine healthcare providers in Indonesia was undertaken.

Process

A search was undertaken using two electronic databases, CINAHL and Ovid MEDLINE from their commencement date until end of January 2017. The search strategy used the following keywords: "healthcare providers", "health

workforce", "human resources", and "Indonesia". The search used the keywords individually and in combination. The Indonesian government, the World Health Organisation (WHO), and the World Bank websites were also searched for information about Indonesian healthcare providers. Articles or documents were included if they reported on the human resources associated with the provision of health services in Indonesia including the quantity, the distribution, and the implementation to overcome the distribution problems. Articles were excluded if they were in languages other than English or Bahasa Indonesia and letters to the editor.

Results

There were 92 articles identified from the CINAHL and 222 articles from the Ovid MEDLINE search. Based on the title and abstract, there were 10 articles from the CINAHL and nine articles from Ovid MEDLINE, total of 19 articles that met the inclusion criteria. There were six duplicated articles leaving 13 articles to be further reviewed. Following further review, eight articles were excluded, as they did not contain relevant information about the healthcare resources in Indonesia, leaving five articles for inclusion in the review. There were five documents identified which met the inclusion criteria from the search of the Indonesian government, the WHO, and the World Bank websites. In total, there were ten articles reviewed for this paper (Figure 1 and Table 1).

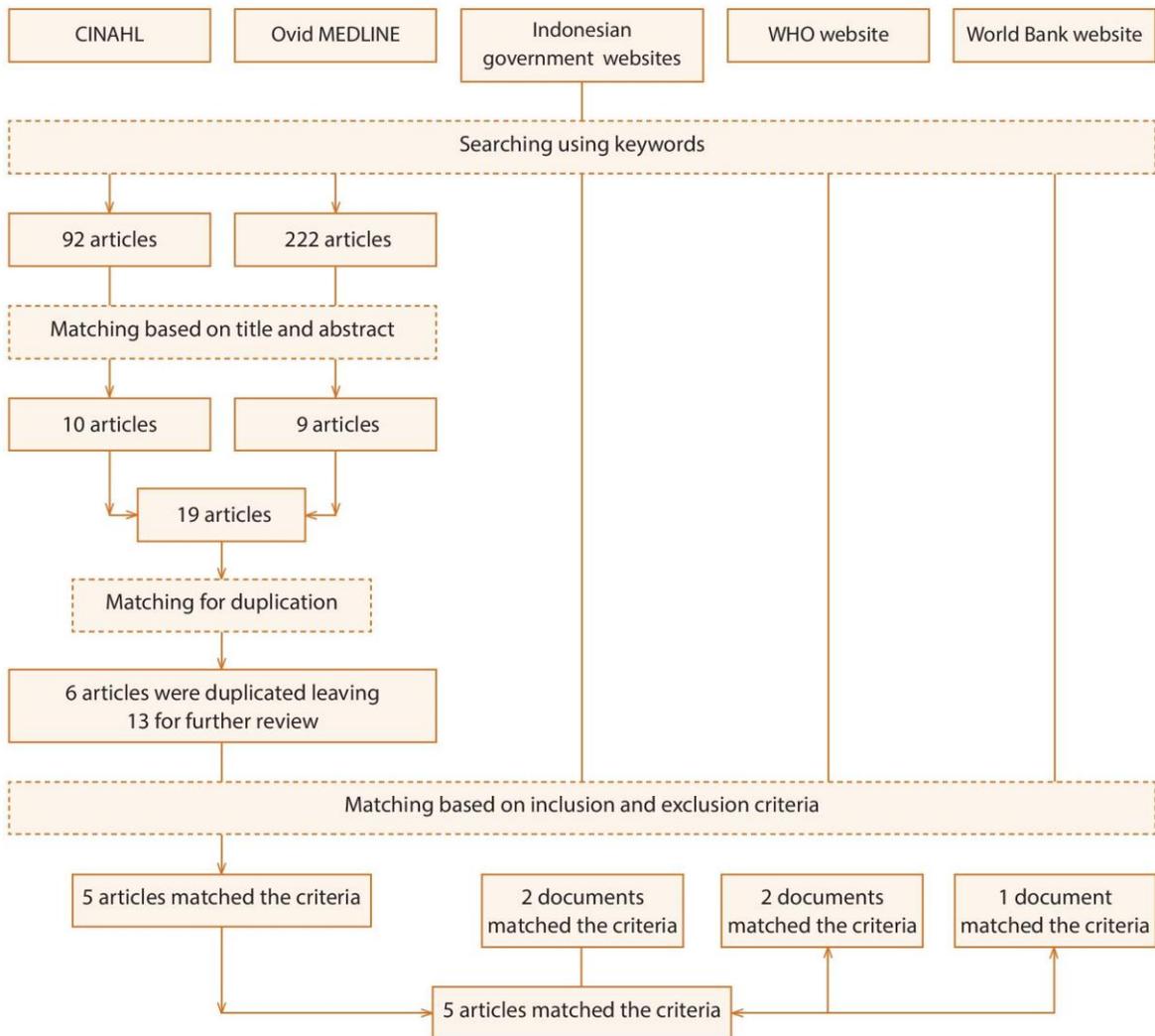
Discussion

The number of healthcare providers

Despite the inequitable distribution of the health workforce in Indonesia, data from the Indonesian Ministry of Health shows that in 2015 there were 876,984 healthcare providers working in public and private sectors in Indonesia with nurses the majority, 233,910 (34.6%). [3] Healthcare providers in Central Java (76,819), East Java (69,405), and West Java (66,152) provinces accounted for the highest number compared to other provinces. The number of specialist doctors was higher than general physicians; this is because general physicians working independently or in management are not counted in the medical service sector. [3] The details of the healthcare providers can be seen in Table 2.

Compared to other South East Asian countries such as Thailand, a report from the WHO shows that the number of healthcare providers in Indonesia has been higher than in Thailand for both 2009 and 2010. The report shows that in Indonesia there were 34,544 and 33,736 medical practitioners in 2009 and 2010 respectively, [5] while there were 21,569 and 26,244 medical practitioners in Thailand for

Figure 1. Articles and documents retrieved from databases and websites



the same period. [6] However, Thailand had a higher medical practitioner to population ratio compared to Indonesia. The report shows that the ratio of medical practitioners to population in Indonesia was 0.15 per 1,000 population in both 2009 and 2010, where it was 0.33 and 0.41 per 1,000 population in Thailand for 2009 and 2010 respectively. Similar trends also occurred for other healthcare professionals. [6]

A study by Kurniati et al [7] shows an increase in health workforce ratio (doctors, nurses and midwives) in Indonesia from 0.95 per 1,000 population in 2006 to 2.63 per 1,000 population in 2014. Despite this development, based on the 2016 World Health Statistics from the WHO, the ratio of skilled health professionals (physicians, nurses and midwives,

dentists, and pharmacists) to the population in Indonesia was lower compared to other South-East Asian countries such as Maldives, Thailand, India, Sri Lanka, and Myanmar but higher than Bhutan, Timor Leste and Bangladesh. [8] In 2006 to 2013, the average ratio of physicians was 2.0 per 10,000 population in Indonesia whereas the average in Southeast Asian countries was 5.9 per 10,000 population and the average among lower-middle income countries was 7.8 per 10,000 population. [9] The ratio of nurses and midwives has had a similar trend, 13.8 per 10,000 population in Indonesia, 15.3 per 10,000 in Southeast Asian countries and 17.8 per 10,000 among lower-middle income countries. [9] However, the nurses and midwives ratio in Indonesia was

Table 1. Articles and documents retrieved for review

AUTHOR(S)	TITLE	INFORMATION AVAILABLE IN THE ARTICLE
Meliala, Hort, & Trisnantoro, 2013	Addressing the unequal geographic distribution of specialist doctors in Indonesia: The role of the private sector and effectiveness of current regulations	<ul style="list-style-type: none"> - Numbers and distribution of specialist doctors - Identification of regulations - Source of income - Work practices
Kurniati, Roskam, Afzal, Suryowinoto, & Mukti, 2015	Strengthening Indonesia's health workforce through partnerships	<ul style="list-style-type: none"> - Human resources for health planning through the multi-stakeholder coordination approach - Support to multi-sectorial human resources for health coordination - Multi-sectorial human resources for health coordination towards achieving Universal Health Coverage - Challenges of multi-sectorial coordination
Heywood & Harahap, 2009	Human resources for health at the district level in Indonesia: the smoke and mirrors of decentralization	<ul style="list-style-type: none"> - Density of health care providers - Employment status - Primary place of work for those in the public sector
Efendi, 2012	Health worker recruitment and deployment in remote areas of Indonesia	Policies to support the recruitment and deployment health workers in rural and remote areas
Diana, Hollingworth, & Marks, 2015	Effects of decentralization and health system reform on health workforce and quality-of-care in Indonesia, 1993-2007	<ul style="list-style-type: none"> - Type and distribution of the workforce - Quality of care in both public and private healthcare facilities - The impact of decentralization
Kementerian Kesehatan Republik Indonesia, 2013	Profil Kesehatan Indonesia 2012	<ul style="list-style-type: none"> - The quantity and ratio of health workers - PTT health workers - Special assignment health workers - Health worker registration
Kementerian Kesehatan Republik Indonesia, 2016	Profil Kesehatan Indonesia 2015	<ul style="list-style-type: none"> - The quantity of health workers - Ratio of health workers - Health workers registration - The efficiency of health workers
World Health Organisation, 2014	Human Resources for Health Country Profile: Indonesia	<ul style="list-style-type: none"> - Health workforce situation - Human resources for health production - Human resources for health utilization - Governance for human resources for health
World Health Organisation, 2014	World Health Statistics 2014	Density of health workforce
Rokx et al., 2010	New Insight into the Provision of Health Services in Indonesia: A Health Workforce Study	<ul style="list-style-type: none"> - Indonesia's health system and policies affecting the health workforce - The supply and distribution of health practitioners and health facilities - Effects of changes in the supply of health workers on the use of health services - The quality of public health facilities and practitioners - Discussion and policy suggestions

Table 2. Healthcare Providers in Indonesia

HEALTHCARE PROVIDERS	QUANTITY	RATIO*
Specialist doctors	47,849	18.7
General physicians	41,026	16.1
Specialist dentists	1,054	0.4
Dentists	11,686	4.6
Nurses	233,910	87.6
Midwives	111,736	51.6
Pharmacists	30,329	11.9

*per 100,000

higher compared to Timor Leste, Bangladesh and Myanmar, but lower compared to Sri Lanka and Thailand, which can be seen in Table 3.

Despite the differences between healthcare providers to population ratio, the number of medical-related schools (medical, nursing, and midwifery) in Indonesia was higher (1,199) than other Southeast Asian countries including Brunei (3), Singapore (5), Malaysia (120), Philippines (824), Vietnam (28), Laos (7), Cambodia (14) and Myanmar (47). [10] Thus, there are more medical-related students graduating in Indonesia, but, with a population of more than 255 million and a population growth rate of 1.49% per annum, Indonesia continues to face a crisis with adequate health workers. [7] However, Indonesia and the Philippines are the two countries exporting many doctors and nurses compared

to other Southeast Asian countries. [10] This situation may exacerbate the health worker crisis in Indonesia both in hospitals and *puskesmas*.

The *puskesmas* and hospital are the two major types of health facilities in Indonesia. The *puskesmas* is a community health centre, which is established at the sub-district level and organised by the district government. [11] There were 9,754 *puskesmas* and 2,488 hospitals in Indonesia in 2015 with 258,568 healthcare providers in the *puskesmas* and 493,856 healthcare providers in the hospitals. [3] The details of the distribution of the healthcare providers in the hospitals and *puskesmas* can be seen in Table 4.

As Table 4 demonstrates, the number of midwives and nurses were almost equal in the *puskesmas*. Both professions account for the largest number of healthcare professionals in the *puskesmas*. However, the number of nurses was highest among healthcare providers in hospitals in Indonesia and the number of midwives was one-fifth of the number of nurses. While the number of specialist doctors was not available for the *puskesmas*, these professionals accounted for the second largest number of healthcare providers in hospitals.

Distribution of healthcare providers in Indonesia

Based on a study by Meliala and colleagues, [1] the distribution of specialist doctors was unequal across Indonesia, with most specialists concentrated on Java and Bali Islands where most were situated in urban areas. Even though the data was collected at eight out of 33 provinces in Indonesia; Papua, North Sulawesi, West Nusa Tenggara,

Table 3. Comparison of Healthcare Provider Ratio between Indonesia and other Countries

CATEGORY	PHYSICIANS*	NURSES AND DENTIST*	PHARMACIST*	MIDWIVES*
Indonesia	2.0	13.8	1.0	1.0
Bangladesh	3.6	2.2	0.3	0.6
Myanmar	6.1	10	0.7	-
Sri Lanka	6.8	16.4	0.8	0.4
Thailand	3.9	20.8	2.6	1.3
Timor Leste	0.7	11.1	0.4	1.1
South-East Asian countries (average)	5.9	15.3	1.0	3.8
Lower-middle income countries (average)	7.8	17.8	1.2	4.2
Global (average)	14.1	29.2	2.7	4.3

*(per 10,000 population)

Yogyakarta, Central Java, DKI Jakarta, Bengkulu, and North Sumatera, the results could be considered representative of Indonesia as the samples were varied and from less-developed to developed provinces. The study showed that provinces of Java Island had higher health provider ratios compared to provinces in eastern Indonesia. [1] Similarly, unequal distribution of healthcare providers also occurred in Cambodia up to 2010, especially for medical doctors and midwives. [12] More than half the medical doctors (54%) worked in the capital city of Cambodia where only 9.3% of the population lives. [12]

The imbalanced distribution of the Indonesian healthcare workforce was not only for specialist doctors, but also for other healthcare providers such as nurses, midwives, nutritionists, and sanitarians. [13] Most of the health workers were not willing to serve in rural areas due to communication problems, inadequate basic and social facilities, decreased remuneration and no further reward, security issues due to living in a rural area, and career uncertainty. [13] However, the decentralisation implemented in Indonesia allowed local governments to manage their human resources including healthcare providers which tended to reduce the gap between urban and rural areas in Indonesia. [14] Furthermore, dual sector practice among specialist doctors is common in Indonesia with specialist doctors working in both public and private sectors, even though they are government employees. [1] The dual sector practice may increase access to health services, including in rural areas due to the availability of additional health professionals. [4] Several regulations had been implemented to manage dual sector practice among doctors including tighter contract arrangements, raising public sector salaries, and regulation within professional organisation. [1]

Cambodia also had a similar situation where staff shortages in rural areas arose due to inadequate salaries, lack of security, medical and drugs supplies, and inadequate government management. [12] This staff shortage in rural areas had several impacts on healthcare services in Cambodia. Due to the belief that the government had a low quality health service, people in Cambodia tend to go to private health facilities when seeking help. [12] Almost half of the people (48.2%) sought treatment from the private sector, 21.6% from the public sector and 20.8% from the non-medical sector. [15] This included the high use of informal health services where some of the personnel were untrained, such as traditional healers. [12] However, the health worker shortage is also one of the problems faced by a more developed country like Singapore. Even though the average of nurse to patient ratio in Singapore was better (1:200) [16] than Cambodia (1:4,875), [12] there was an imbalance between graduate nurses and the demand for nurses in Singapore; therefore, Singapore recruited nurses from other countries such as China, England, India, Malaysia, Myanmar and Philippines. [16]

There have been several programs implemented by the Ministry of Health of Indonesia in order to minimise the imbalanced distribution including compulsory service regulation, the PTT program, and special assignment for strategic health workers including nurses, sanitarians and nutritionists, [13] as well as providing additional incentives for healthcare providers who are willing to serve in rural areas. [1] The additional incentives were provided by the Ministry of Health (central government) or from local government where healthcare providers are given an allowance from the Ministry of Health of up to USD\$750 per month for specialist doctors and USD\$500 per month for general practitioners.

Table 3. Healthcare Providers in Puskesmas and Hospitals in Indonesia

CATEGORY	PUSKESMAS		HOSPITALS	
	QUANTITY	RATIO*	QUANTITY	RATIO**
Midwives	79,314	8.1	30,561	12.3
Nurses	73,311	7.5	147,264	59.2
General Physicians	16,656	1.7	23,130	9.3
Dentists	6,537	0.7	4,831	1.9
Specialist doctors	N/A	N/A	47,605	19.1

*(per *puskesmas*) ** (per hospital)

The additional incentives from local government are varied and range between USD\$500 to USD\$2,500 per month. [1] In comparison, in Thailand, an incentive program was given to the doctors serving in rural areas along with an annual award from a renowned organisation or foundation for healthcare providers working in rural areas to reinforce their commitment. [17] Additionally, personal career advancement has been in place since 2007 for those working in rural areas where they can be promoted to achieve level 9 in their professional career position, which previously was only up to a level 8. [17] Level 11 is the highest-ranking position in the professional career in Thailand with a level 9 position equivalent to a deputy director general. [17]

The compulsory deployment service in Indonesia was instigated from 1961 to 2003. During this time all graduates, including health institution graduates, had to serve at least five years after completing their study with the timing and location dictated by the Ministry of Health. [13] However, this regulation ceased in 2003 and all graduates have the same right to choose their job without any discrimination. [18] As a result, a disproportionate number of healthcare providers elect to serve in urban areas compared to rural areas. [13] Thailand had a similar program of mandatory service in rural areas for new medical and nursing graduates, which has been in place since 1974 where it is compulsory for new graduates to work in rural areas for three years. [17]

The PTT or hiring contracted staff was another effort of the government to minimise the unequal distribution of the health work force in Indonesia. This program was launched in 1991, based on the President Decree No. 37 of 1991, which states that doctors, dentists, and midwives have an obligation to work as contract staff for a minimum of three months and up to three years after graduation. [13] Since the contracted staff can choose the area where they want to serve, in 2006 the Ministry of Health determined that contracted staff would work at remote or very remote areas for minimum of six months and up to two years. [13] Starting from 2007, the mandatory program of PTT was changed to a voluntary program, however, the PTT program was still favored by healthcare graduates. [13] By the end of 2012, there were 45,777 PTT staff across Indonesia [19] and these numbers remained the same in 2015, 44,449 PTT staff consisting of 29 specialist doctors, 1,659 general practitioners, 803 dentists, and 41,958 midwives. [3]

Another program implemented by the Ministry of Health to reduce the distribution gap in healthcare providers' locations in Indonesia is the special assignment. This program was

started in 2009 with the objective of increasing access and quality of health services in disadvantaged areas, border areas and small islands, areas with health difficulties, and small hospitals. [19] The number of healthcare providers who participated in the program during 2012 was 658 general practitioner residents, 1,009 nurses, 228 dieticians, 196 sanitarians, 114 health analysts, 17 midwives, 52 pharmacists, 21 dental nurses and one psychiatrist, radiologist, and medical recorder. [19] The Indonesian Ministry of Health implemented a team-based special assignment in May 2015, called *Nusantara Sehat* program, where healthcare providers were dispatched to targeted areas. [3]

As part of the government program to increase the health status of all Indonesians, a program called *Jaminan Kesehatan Nasional (JKN)* was implemented with the launch of the universal health insurance, the *Badan Penyelenggara Jaminan Sosial (BPJS)* in January 2014. [20] The BPJS aimed to ensure health maintenance and protection for all Indonesians. However, the implementation of the BPJS was not linked to the distribution of health workers. Almost four years after the implementation, the distribution of health workers remains concentrated on Java Island. [21] Indonesians who have been unable to access health facilities or health workers within their areas have been offered compensation by BPJS through fund reimbursement, deploying healthcare providers, or providing a special health facility. [22]

Thailand implemented the Collaborative Project to Increase the Production of Rural Doctors (CPIRD) and the One District, One Doctor (ODOD) program. [17] The CPRID is the recruitment of twelfth-grade students passing the examination to pursue a medical degree and who are required to reside within a given province after graduation. Graduates from the ODOD are also required to be resident in a given district. The CPRID was in place from 1995 to 2015 while the ODOD was in place from 2005 to 2015. [17] There was a three year mandatory time to serve in a district hospital for CPRID and a twelve year compulsory time to serve in their home town for the ODOD; otherwise, there was a USD\$13,000 penalty for CPRID and USD\$65,000 for ODOD if they failed to meet the terms. [17] Both programs were successful in providing medical doctors in rural areas of Thailand. This is because 92% of 5,926 doctors involved in the CPRID and ODOD program remained working in the assigned areas. [23] In addition, both programs had positive impact on the graduates as more than 95% of graduates

involved in the programs passed the comprehensive and the national license examination and they had better clinical competencies than graduates with a normal track. [23]

Imbalanced distribution of health workers is an international issue. The WHO has issued a global strategy on human resources for health to ensure the equitable access to health workers within strengthened health systems. [24] One of the objectives of the global strategy is to align investment in human resources for health to address shortages and improve distribution of health workers. For Indonesia, as the fourth largest country by population in the world, regulation to manage workforce maldistribution may be more appropriate. Graduates of health professions may be in over-supply on Java Island, but not in other rural areas of Indonesia. For example, there were 22,263 graduate nurses in 2014 but only 13,528 (39%) had been employed. [25] East Java province has the highest numbers of nursing schools, 55 Diploma of Nursing and 53 Bachelor of Nursing schools, producing around 12,000 nurses every year, with only 10% employed. [26] On the other hand, the 2015 annual report of the Indonesian Ministry of Health shows that the ratio of nurses to population was 87.65 per 100,000 population which was below the target, 180 per 100,000 population. [3] This demonstrates a need for regulation of graduates' education so that all health professional graduates, mainly from Java Island, can be well distributed to all areas of Indonesia.

The WHO global strategy on human resources for health emphasises the strengthening of integrated aspects of health workers including planning, financing, education, regulation, and management. [24] The 2015 annual report of the Ministry of Health of Indonesia shows that the regulations in distributing health workers in Indonesia include PTT, special assignment, both residents and internship programs, and team-based assignment. [3] The report shows that during 2015, there were 44,449 health workers, mostly midwives, involved in the PTT program; 748 health workers engaged with resident special assignment; 8,312 health workers involved in the internship special assignment program; and 695 health providers for the *Nusantara Sehat* program. [3] The *Nusantara Sehat* program is still being implemented in 2017 by dispatching 1,422 health workers to the 28 provinces and 91 districts of targeted areas. [21] Evaluation and re-planning of the programs based on WHO global strategy on human resources is important to overcome the unequal distribution of human resources on health in Indonesia.

This study was potentially limited by a paucity of evidence covering health workers in Indonesia within the online medical related databases. Grey literature such as that found on Indonesian, WHO, and World Bank websites has been utilised to enhance the analysis of the paper.

Conclusion

Indonesia continues to develop strategies towards a successful distribution of healthcare providers. The ratio of healthcare providers to the population in Indonesia is lower compared to the average of South East Asian countries (the same as the average for dentists) and lower-middle income countries. Several programs have been established including a compulsory service for medical graduates to staff remote areas. The PTT program, contracted program, and special assignment are other programs designed to staff health facilities in rural and remotes area of Indonesia. A study investigating the impact of the programs reducing the imbalanced distribution of healthcare providers on health outcomes is essential for Indonesia. Also, an evaluation of the number and location of education institutions for health professions is needed which may also require a national regulation regarding the distribution of the graduates.

Acknowledgments

None.

Competing interests

The authors declare they have no competing interests.

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2.5 The Prehospital and Healthcare System in Malang, Indonesia

As mentioned, this research was undertaken mainly in Malang, East Java, Indonesia. The following paper describing the healthcare system and prehospital care in Malang sought to enhance the understanding of healthcare provided to the community, especially prehospital care. The paper begins with information about health facilities and prehospital care in the area, followed by a description of human resources, including prehospital care providers. The prehospital system remains unorganised in Malang, although the area might have the most advanced emergency care education in Indonesia with the establishment of the Emergency Medicine Specialist programme and Master of Nursing programme for students majoring in emergency nursing. It is expected that prehospital education for nurses in Indonesia can be implemented in Malang with support from the Australian government and universities.

Review

The pre-hospital and healthcare system in Malang, Indonesia

Suryanto PhD candidate and Lecturer, School of Nursing^{1,2}; Malcolm Boyle PhD, Academic Lead in Paramedic Education³; Virginia Plummer RN, PhD is Associate Professor of Nursing Research^{1,4}

Affiliations:

¹Monash University, Victoria, Australia

²Brawijaya University, Indonesia

³Griffith University, School of Medicine, Queensland, Australia

⁴Peninsula Health, Victoria, Australia

Abstract

Introduction

Malang is the second largest city in East Java and consists of three districts: Malang Regency, Malang City and Batu City. Malang has the most advanced emergency care education in East Java, and possibly Indonesia. The recent launch of the 119 Emergency Medical Service may influence pre-hospital care in Malang and assist in developing a more organised emergency medical system in the area.

Objective

This paper describes the pre-hospital care and healthcare structure in Malang and focuses on the health facilities, pre-hospital care service and healthcare providers.

Discussion

There are two major types of healthcare facilities in Malang, hospitals and primary healthcare centres called 'puskesmas'. Ambulance service provision in Malang is either hospital-based or puskesmas-based. There is no organised emergency medical system in Malang. In the case of an emergency, the patient or bystander calls the hospital emergency department or puskesmas. The use of ambulances in Malang is low due to the perceived prohibitive cost of the service. Ambulance service fees for emergency cases outside of the hospital or puskesmas are not covered by the universal health insurance in the country. There is no specific pre-hospital trained staff in Malang. Nurses are responsible for staffing the ambulance, and there is no formal pre-hospital care education for those nurses working in an ambulance.

Keywords:

healthcare; health system; prehospital; ambulance; nurse; developing country; Indonesia

Corresponding author: Suryanto, suryanto.s@monash.edu; suryanto.s@ub.ac.id

Introduction

Malang is the second largest city in East Java Province, the second most populated province in Indonesia after West Java Province (1). East Java Province covers a 47,799.75 km² wide area consisting of more than 60 islands and a population of 41,437,769 people in 2014 spread over 38 districts: 29 regencies and nine cities. These districts are further divided into 662 sub-districts which consist of 782 urban villages and 7,741 rural villages (2,3). The majority of people in the province are from the Java tribe and are Muslim (3). Even though the population of East Java Province is the second largest after West Java province, the number of healthcare providers in East Java Province is the greatest at 108,220 health workers including 31,099 non-health workers (4). Those healthcare providers are distributed in two major health facilities, the hospitals and the primary healthcare centres called puskesmas.

The Malang area, commonly called Malang Raya (The Greater Malang) is one of the largest areas in East Java Province and consists of three districts: Malang Regency, Malang City and Batu City. Batu City was previously part of Malang Regency, as one of the sub-districts, however, since 2001, based on the Republic of Indonesia Law No. 11 of 2001, it has become an independent district under the East Java Province (5). Malang City and Batu City cover less than 10% of the Greater Malang, which is mostly made up of Malang Regency. Malang City and Batu City have a more rapidly developing economy than Malang Regency, thus people tend to live in the urban areas for lifestyle and employment reasons. The economic development in the area also influences the healthcare services where more hospitals with specialty services are available in Malang City (6-8), hence, healthcare workers in the Malang City area account for a higher number compared to the other two areas (9).

Previously (around the year 2000), there was an ambulance system known as 118 Emergency Ambulance Service, which was functional in 18 Indonesian cities including Jakarta, Palembang, Yogyakarta, Surabaya, Makassar, Denpasar and Malang (10). The system was terminated within 5 years due to a lack of funding support from the government (10). A breakthrough followed 10 years later in the Indonesian pre-hospital care system with the launch of the 119 Emergency Medical Service by the Ministry of Health of Indonesia in July 2016 (11). The launch of the new pre-hospital care system may enhance the pre-hospital care services in the area as Malang has the most advanced emergency care education in East Java (and possibly Indonesia) and an emergency medicine specialist medical program and Master of Nursing program majoring in emergency nursing (12).

Methods

The information and data in this paper are mostly obtained from the grey literature including the website of the Indonesian Ministry of Health both at a national level and provincial level. Google Scholar, MEDLINE, EMBASE and CINAHL were used to obtain the latest research on pre-hospital care in Malang and the development of pre-hospital care in other countries.

Discussion

Health facilities

There are 315 hospitals in East Java Province consisting of 233 general hospitals and 82 specialty hospitals (13). General and specialty hospitals are classified in Indonesia from Class A to Class D, with Class A the highest hospital class and Class D the lowest. This classification is based on the health services provided by the hospital (14). Most of the hospitals in East Java Province are Class C hospitals (116 hospitals), 55 hospitals are Class D hospitals, 41 are Class B hospitals, and five are Class A hospitals, with 98 hospitals not yet certified by the Ministry of Health (13).

The geographic distribution in Malang has an effect on the health facilities in the area. As for other areas in Indonesia, there are two major types of healthcare facilities in Malang, the hospitals and puskesmas. Based on urban development, compared to the other two districts, there are more hospitals in Malang City. There are 25 hospitals in Malang City, 17 hospitals in Malang Regency and three hospitals in Batu City (6-8). On the other hand, due to the large less-urban areas in Malang Regency, it has more puskesmas available. There are 39 puskesmas in Malang Regency, 15 puskesmas in Malang City, and five puskesmas in Batu City (15). Batu City was the area with the least number of healthcare facilities due to the city previously being a sub-district of Malang Regency. Furthermore, there were more Class C hospitals and specialty hospitals in Malang City, plus a quantity of general hospitals. Crossing the boundaries to seek healthcare occurs with most of the people in Malang Regency and Batu City tending to go to Malang City hospitals for specialty services.

Although there were more puskesmas in Malang Regency, the ratio of puskesmas to the population in Malang Regency was the lowest, 1.4 per 100,000 people. Surprisingly, Batu City, with the least number of puskesmas has the highest ratio, 2.5 per 100,000 people. Malang City, with the highest number of hospitals, has the highest ratio of hospitals to population, 2.9 per 100,000 people. The detail of ratio of healthcare facilities in the three districts is shown in Table 1.

Table 1. Ratio of healthcare facilities in Malang (9)

Characteristics	Malang Regency*	Malang City*	Batu City*
Hospitals	0.6	2.9	1.5
Puskesmas	1.4	1.7	2.5

*per 100,000 people

The ambulance service in Indonesia is either puskesmas-based or hospital-based. Not all emergency departments (ED) of a puskesmas or hospital can provide emergency care, which includes an ambulance service. Based on the Indonesian Ministry of Health Law No. 856 of 2009, there are four levels of ED in Indonesia. Level I ED is the lowest ED level and Level IV ED is the highest level (16). The Level IV ED includes the availability of a ventilator, high care units, resuscitation ward and intensive care unit; the availability of an on-call service for all sub-specialties and on-site for four major specialist doctors (surgeon, obstetrician, paediatrician and internist). On the other hand, a Level I ED provides only stabilising and evacuating of patients with no specialist doctor services available (16). Level IV ED is the minimum standard for a Class A hospital, Level III ED is the minimum standard for a Class B hospital, Level II ED is the minimum standard for a Class C hospital, and Level I ED is the minimum standard for a Class D hospital (17).

More than 80% of hospitals in East Java, including 223 (89.4%) general hospitals and 98 (86.7%) specialty hospitals in East Java Province are able to provide Level I emergency care

(Table 2) (17). Importantly, 469 (91.4%) of the puskesmas are also able to provide Level I emergency care (15). There is no published data about the number of hospitals and puskesmas with Level II to IV emergency care in East Java Province.

The annual report on health of East Java Province shows a distribution of health facilities in Malang compared to those elsewhere in East Java (15). All general hospitals and in-patient puskesmas both in Malang Regency and Malang City are able to provide emergency care services, but one out of three hospitals and all puskesmas in Batu City are unable to provide these services (15). The majority of specialty hospitals cannot provide emergency care services in those three districts, only two out of 22 specialty hospitals are able to provide the emergency services (Table 3).

Pre-hospital care setting

Currently, there is no organised emergency medical system in Malang. The previous emergency medical system for the Malang area was the implementation of the 118 service that was operational in around 2000. Malang was one of the seven cities that implemented the 118 service, others included Jakarta, Palembang, Yogyakarta, Surabaya, Makassar and Denpasar (10). The ambulance service in Malang is either hospital-based or puskesmas-based. In the case of an emergency, the patient or bystander would call the hospital ED or puskesmas where they want to be admitted. Then, depending on the availability of an ambulance, the patient may be picked-up by an ambulance, but in most cases the patient tends to use a private vehicle instead of using an ambulance.

Table 2. Healthcare facilities with Level I emergency care in East Java Province (15,17)

Health facilities	Quantity	Availability of Level I ED	
		n	%
General hospitals	258	223	86.4
Specialty hospitals	113	98	86.7
Puskesmas with in-patient facility	513	469	91.4
Other health facilities	224	19	8.5

Table 3. Health facilities in Malang providing emergency care (15)

Districts	General hospitals		Specialty hospitals		Puskesmas with in-patient facility	
	n	Providing emergency care	n	Providing emergency care	n	Providing emergency care
Malang Regency	15	15 (100%)	6	1 (16.7%)	27	27 (100%)
Malang City	9	9 (100%)	14	0 (0%)	4	4 (100%)
Batu City	3	2 (66.7%)	2	1 (50%)	3	0 (0%)

Compared to other lower-middle income countries, Indonesia is not the only country that does not have an organised EMS system. Other countries include India, Morocco, Vietnam, Armenia, Nigeria, Ghana and Sri Lanka (18). The establishment of the Tulungagung Emergency Medical Service (TEMS) initiated the launch of the current 119 Emergency Medical Service in Indonesia. The 119 service has been implemented in 27 locations in the country, mostly on Java Island (11). Similarly, India initiated the establishment of an EMS system in 2002 (19) with the system then adopted in the nine states of India in 2011 (20). In Nigeria, initially, there were seven ambulance stations during the piloting of an EMS system in the country in 2004 and within 10 years, the system was available in every district in Nigeria (21). There is no published data about the coverage target of the 119 service in Indonesia.

The launch of the 119 service was in conjunction with the establishment of the National Command Centre (NCC) in Jakarta and Public Safety Centres (PSCs) in the 27 locations involved in the system (11). The 27 locations involved in the pilot project were chosen because the areas have national government hospitals (22). Based on the Indonesian government regulation, PSCs must be available gradually in every district/city in Indonesia and function as the centre of emergency care services in the area (22). Currently, the PSCs utilise a local phone number and it is projected that the PSCs will have an integrated service with the police and fire department in every district (23). With the current EMS system, emergency calls are received by the NCC in Jakarta and then transferred to the PSC in the district closest to the incident. The PSC then deploy an ambulance from either a puskesmas or hospital to the scene. The system does not only manage the ambulance services but also provides the information regarding the availability of emergency units and in-patient rooms in the hospitals. Several challenges in implementing the system include the lack of infrastructure and resources (24), the delay in responding to the calls due to a lack of staff available in the NCC, and the delay in transferring calls from the NCC to PSC (11).

The TEMS was established in November 2015 in Tulungagung, East Java Province and integrates the ambulance service with police, army, fire and the disaster management department (25). With the use of the Global Positioning System ("GPS"), the TEMS coordinates the ambulances both from the puskesmas and hospital EDs in Tulungagung (27). The TEMS has become a blueprint model for the 119 service in Indonesia (28). However, due to a lack of information provided to the community, especially the call centre number, the TEMS service is under-utilised (27). Therefore, enhancing public awareness of pre-hospital care is one of the essential keys in developing the pre-hospital system.

As the largest hospital in the Malang area, Saiful Anwar Hospital, which is located in the Malang City area, received 72-73 emergency ambulance calls per month in 2011 (29). With the population of more than 800,000 people in Malang City (30), the numbers show the low utilisation rate of ambulance services in the area. Only 11% (3,160) of patients were transported by ambulance to the Saiful Anwar Hospital ED, 89% (9,758) of pre-hospital patients were brought in by other vehicles (31). As Saiful Anwar Hospital is the largest hospital in the area, the other hospitals may have lower numbers of ambulance utilisation. The implementation of the universal health insurance in Indonesian called Badan Penyelenggara Jaminan Sosial (BPJS), which commenced in January 2014, may also influence the use of an ambulance by the people. By the end of 2015, more than half of the Indonesian population of 157 million people were covered by the new universal health insurance (32). The BPJS covers the ambulance service. The premium fee paid each month includes the ambulance service but this covers services for referral purposes only and not emergency pre-hospital care services. The ambulance service covered includes a condition that both originating and destination health institutions must have a funding agreement with the BPJS (33). Currently, there are 19,969 health institutions that have a funding agreement with the BPJS as primary health facilities, including the puskesmas, general practitioner clinics and medical clinics. There are 1,847 health institutions classified as advanced health facilities including both government and private hospitals (32). Unfortunately, in the case of an emergency outside the hospital or puskesmas, such as traffic accident or heart attack, or any referral between health institutions which have no funding agreement with the BPJS, the ambulance service cost is not covered with the monthly premium fee (33) and hence the patient must pay for ambulance services or use other transport.

Traffic accidents have become one of the major pre-hospital concerns in Malang. There were 623 traffic accident cases in Malang Regency in 2012, which resulted in 140 deaths and 796 minor injuries (34). There were 13,383 out of 26,907 (49.7%) trauma cases managed by the Saiful Anwar Hospital ED in 2007, with 72.9% (9,758) being male patients and a 2.8% mortality rate (31). Motorcycle accidents accounted for the highest incidence of traffic accidents in Malang. In 2012, there were 771 motorcycle injuries in the city (34). Unfortunately, most of motorcycle accident patients admitted to the Saiful Anwar Hospital ED with open fractures did not have a driver's licence. Those who did have a licence mostly had never undergone a driving licence test (35) as they had obtained a licence illegally. The most recent traffic accident study in Malang found accidents involving 263 motorcyclists showed that human factors had a significant contribution to a traffic accident. The main causes of the accident included carelessness, drowsiness, drunkenness, fatigue, unskilled rider and indiscipline and speeding (34).

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The study also showed that vehicle factors such as brake or headlamp malfunction had no significant contribution to the accidents, but environmental factors including road cornering and rainfall did have a significant contribution (34). Interestingly, road conditions, including slippery or damaged roads, did not significantly contribute to accidents, which were more likely caused by human factors.

Human resources

Even though the population of East Java Province is the

second largest in Indonesia (1), the number of healthcare providers in East Java Province is the greatest at 108,220 health workers, plus 31,099 allied health workers (4). As Malang City has the largest number of advanced health facilities, the number of healthcare providers in Malang City was also the highest compared to the other two districts. In 2014 there were 6,179 healthcare providers in Malang City, 4,340 in Malang Regency, and 910 in Batu City (9). The details of healthcare providers in those three districts can be seen in Table 4.

Table 4. Healthcare providers in Malang (9,36)

Healthcare providers	Malang Regency		Malang City		Batu City		East Java Province		Indonesia	
	n	Ratio*	n	Ratio*	n	Ratio*	n	Ratio*	n	Ratio*
Specialist doctors	183	6.6	618	70.9	58	29.1	5,144	13.3	47,849	18.7
General practitioners	251	9.1	196	22.5	64	32	4,496	11.6	41,026	16.1
Dentists	25	0.9	85	9.7	19	9.5	1,683	4.4	11,686	4.6
Nurses	1,107	40.1	2,032	233.6	271	135.5	32,828	85.1	223,910	87.6
Midwives	772	27.9	388	44.5	84	41.9	15,548	40.1	111,736	43.7
Pharmacists	188	6.8	290	33.3	38	18.9	6,227	16.1	30,329	11.9
Other healthcare Providers	422	15.3	426	48.9	92	45.9	11,195	28.9	179,580	70.3
Total	2,948	N/A	4,035	N/A	626	N/A	77,121	N/A	646,116	N/A

*per 100,000 people

Based on Table 4, Malang City has the highest number of healthcare providers. Compared with the population of the three districts, Malang City had the highest ratio of healthcare providers among the districts, except for the ratio of general practitioners (GPs) to population. Batu City has the highest ratio of GPs to population, 32 per 100,000 people. Even though Malang Regency has the highest number of GPs and midwives, the ratio of both healthcare providers in the district was the lowest compared with the other two districts.

Similar to other areas in Indonesia, there is no specific pre-hospital-trained staff in Malang. Nurses are responsible for staffing the ambulance for both hospital-based and puskesmas-based ambulances. However, there is no formal pre-hospital care education for those nurses working in an ambulance. As the largest hospital in Malang, Saiful Anwar Hospital provides some pre-hospital education for pre-hospital providers including advanced trauma life support, basic trauma life support and ambulance protocol. A study showed that the education had a significant contribution to the differences of pre-hospital treatment, ambulance transportation and communication between field attendance and the trauma centre in Malang (37). The study used a pre-post test design involving both nurses and medical doctors working in the pre-hospital care system in Malang and was conducted over two periods, April to July 1999 (n=1,839) and April to July 2003 (n=1,408). The study revealed that pre-hospital education had

a positive outcome for patients where there were significant differences in pre-hospital treatment for patients before and after the study such as intravenous therapy, splinting, medication and wound healing.

As not all nurses working in the ambulance had an education in pre-hospital care management, the latest qualitative study involving six puskesmas-based nurses in Malang demonstrates that nurses had a feeling of powerlessness, and had an emotional response to the process of change when caring for victims of traffic accidents (38). Those feelings indicated a lack of knowledge about treating traffic accident patients. Participants also expressed that they felt worried about endangering the patient due to a lack of knowledge about pre-hospital trauma management. The worry was compounded by a lack of facilities in the puskesmas, a lack of authority and a fear of a lawsuit.

Prasetya et.al investigated the nurses' experience in pre-hospital trauma care involving six hospital-based ambulance nurses in Malang found that there were several obstacles that the nurses faced while working on the ambulance. These included the people's culture, environmental safety issues, difficulties in patient fetching and interprofessional collaboration issues (25). The study highlighted a need for special education in pre-hospital care for nurses working in ambulances and the need of an organised EMS in the area.

In order to enhance the competency of ambulance nurses in Malang, two projects funded by the Australian Department of Foreign Affairs and Trade through the Australia Indonesia Institute have been implemented (24). The projects involved staff from Monash University, Griffith University and Brawijaya University. The sharing of knowledge and experience by Australian university staff about aspects of pre-hospital care has been received by Brawijaya University staff during the pilot project of the Ambulance Nurse Course involving ambulance nurses from both the puskesmas and hospital EDs in Malang and will also be used as part of the nurse specialist program (Emergency Nursing) at Brawijaya University (24). With great anticipation, the course is expected to be delivered by Brawijaya University with a broader range of participants in the future. The signing of a Memorandum of Understanding (MoU) between Brawijaya University and Monash University was undertaken in December 2016. The MoU will maintain the collaborative work between the two universities in pre-hospital education and other health-related education and research. There is an opportunity to enhance the collaboration with the Griffith University for further development of pre-hospital care education in Indonesia.

Even though there is no formal pre-hospital care education for healthcare providers working in an ambulance in Indonesia, emergency care education is developing in the country and Malang is the only city in Indonesia that has advanced education in emergency care for both doctors and nurses. Malang has an emergency medicine specialist program, the only one in Indonesia, and has a Master of Nursing program with a major in emergency nursing, the first of two such programs in Indonesia. The two emergency care education programs were implemented by the Brawijaya University, one of the largest universities in Malang, in conjunction with the Saiful Anwar Hospital. The programs were established with assistance from the Singapore International Foundation which provided voluntary emergency doctors and nurses to improve the emergency care in Malang (39), including the setting up of an EMS system in Malang (40). The assistance program initially focused on traumatology, which was an 8 year assistance program starting in 1996 and ceasing in 2004. Following 2004, it was revised to a general emergency program which included extensive informal training for medical and nursing staff both in-hospital and for pre-hospital emergency services (39). Both doctors and nurses from Saiful Anwar Hospital and Brawijaya University were involved in the training.

The initial management of emergency healthcare education in Malang was assisted by the Singapore International Foundation and the Rotary Club of Malang (12). As the primary focus of the program was traumatology, the committee established the Malang Trauma Service Centre. The committee implemented several preparation courses

for traumatology and emergency care including the Basic Cardiac Life Support, Basic Trauma Life Support, ECG and Resuscitation, Triage Officer, Ambulance Protocol, and Trauma Nursing Care. These courses were supported by the SIF who provided the educational staff (12). To enhance the program, doctors and nurses from Malang were sent to Singapore for clinical experience at the Singapore General Hospital, National University Hospital, Tan Tockeng Hospital and Kangdang Kerbau Hospital in October 1999 (12). As a result, the Emergency Medicine Specialist Program was established in 2003. The Master of Nursing program majoring in emergency care was established in 2011. Using the results of the project supported by the Australian government as a blueprint of pre-hospital care education in Indonesia, the specialist program of Emergency Nursing at Brawijaya University is now under preparation.

Conclusion

Malang, one of the most populated cities in Indonesia has a developed emergency and trauma care service resulting from significant development of an Emergency Medicine Specialist program and Master of Nursing majoring in emergency care program. However, the 119 Emergency Medical Service has not yet been implemented in Malang, thereby continuing the limited pre-hospital care services for the people. The national health insurance scheme does not cover the pre-hospital ambulance service for urgent and acute incidents therefore it is not surprising that a majority of people use private vehicles for transporting patients to hospital. Even though there is no formal pre-hospital care education for ambulance staff, it is believed that the project supported by the Australian government may initiate the establishment of pre-hospital education for nurses working in ambulances in Malang.

Conflict of interest

The authors declare they have no competing interests. Each author of this paper has completed the ICMJE conflict of interest statement. Malcolm Boyle is Editor of the *Australasian Journal of Paramedicine*.

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2.6 Chapter Summary

Healthcare services in Indonesia have been developed with the increasing number of hospitals and *puskesmas* (Kementerian Kesehatan Republik Indonesia, 2016b). The implementation of universal health insurance since January 2014 is believed to be able to enhance healthcare outcomes, especially for people living in rural areas. However, the distribution of healthcare providers in rural areas remains a priority for Indonesia. Since there are no specific prehospital providers in Indonesia, such as paramedics, nurses as the largest group of healthcare providers have a role in prehospital care. This chapter provides background information about the current situation of the healthcare system, healthcare providers, health financing in Indonesia, and prehospital care in Malang, the principal setting of this research. This information is important as a background to answer the research question which focusing on the prehospital care providers and prehospital care system in Indonesia.

The establishment of the SPGDT, followed by the launch of the 119 EMS system, was a breakthrough in the prehospital care system in Indonesia after the implementation of the 118 EAS more than a decade ago. However, the 119 EMS system is not covered by the BPJS and has not been implemented in Malang and services remain limited. Since Indonesia is a LMIC, a wide-ranging literature review about the EMS system in LMICs was conducted to investigate the status of EMS systems in these countries, with the results reported in the following chapter.

Chapter 3 Literature Review

3.1 Introduction

The development of prehospital care in Indonesia was expected to be similar to that of other LMICs. An extended discussion of prehospital care involving other LMICs was thus expected to develop a broader understanding of prehospital issues in developing countries. In turn, investigating and comparing the development of prehospital care systems in different LMICs could enhance an understanding of its development in Indonesia. A literature review using electronic databases investigating the development of EMS systems in LMICs was undertaken.

3.2 EMS Systems in Lower-Middle Income Countries

A search using electronic medical databases was undertaken to investigate the status of EMS systems in LMICs. The paper describes the availability of the EMS system, its funding, the availability of prehospital care providers, their education, characteristics of the ambulances, and the barriers to implementing an EMS system in LMICs.

EMS Systems in Lower-Middle Income Countries: A Literature Review

Suryanto, M.Nurs;^{1,2} Virginia Plummer, RN, PhD;^{1,3} Malcolm Boyle, MCLinEpi, PhD⁴

1. School of Nursing and Midwifery, Monash University, Victoria, Australia
2. School of Nursing, Brawijaya University, Malang, Indonesia
3. Peninsula Health, Victoria, Australia
4. Department of Community Emergency Health and Paramedic Practice, Monash University, Victoria, Australia

Correspondence:

Suryanto, M.Nurs
 PhD Candidate
 School of Nursing and Midwifery
 Monash University, Australia
 Lecturer
 School of Nursing
 Brawijaya University, Indonesia
 E-mail: [REDACTED]

Conflicts of interest: none

Keywords: ambulance; EMS systems; lower-middle income countries; out-of-hospital; prehospital

Abbreviations:

CPR: cardiopulmonary resuscitation
 ECG: electrocardiogram
 ED: emergency department
 EMS: Emergency Medical Services
 EMT: emergency medical technician
 LMICs: lower-middle income countries
 NAS: National Ambulance Services
 UN: United Nations
 VHWS: Village Health Workers
 WB: World Bank
 WHO: World Health Organization

Received: November 15, 2015

Revised: March 24, 2016

Accepted: May 29, 2016

Online publication: December 12, 2016

doi:10.1017/S1049023X1600114X

Abstract

Introduction: Prehospital care is one of the many issues that require addressing by lower-middle income countries (LMICs) where approximately 90% of global injuries occur. This may arise from more traffic in LMICs, poor road conditions, lack of public awareness of the importance of road safety, and the lack of ability to provide first aid to the victims. However, prehospital care in LMICs remains underdeveloped.

Problem: There is insufficient evidence regarding the development of prehospital care among LMICs. Thus, the objective of this study was to investigate the status of Emergency Medical Services (EMS) systems in these countries.

Methods: A review of medical-related electronic databases was designed to identify the development of EMS systems in LMICs. A search of the literature was undertaken using three electronic databases, CINAHL, Ovid Medline, and EMBASE via Ovid, from their commencement date until the end of July 2015. The grey literature was searched using Google Scholar. Articles were included if they reported on the establishment and current status of an EMS system and were excluded if they were letters to the editor, articles focusing on disaster management, a combination of more than one country if the other country was not a LMIC, written in a language other than English or Bahasa Indonesia, and/or focusing only on in-hospital care.

Results: There were 337 articles identified in CINAHL, 731 in Ovid Medline, 891 in EMBASE via Ovid, and 41 in Google Scholar. Based on the title and abstract, 31 articles from CINAHL, 40 from Ovid Medline, 43 from EMBASE, and 11 from Google Scholar were retrieved for further review. There were 92 articles that met the inclusion criteria with 35 articles removed, as they were duplicated, leaving 57 articles to be reviewed. From those 48 countries categorized as LMICs, there were 16 (33.3%) countries that had information about an EMS system, including injury types, patient demographic, prehospital transport, and the obstacles in implementing the prehospital care system.

Conclusion: The implementation and development of an EMS system is varied among LMICs. Many LMICs lack an organized EMS system with most ambulances used purely for transport and not as an emergency care vehicle. Financial issues are the most common problems faced by LMICs with support from developed countries a necessity.

Suryanto, Plummer V, Boyle M. EMS systems in lower-middle income countries: a literature review. *Prehosp Disaster Med.* 2017;32(1):64-70.

Introduction

Prehospital care is one of the many issues that require addressing by lower-middle income countries (LMICs). Even though communicable diseases remain the focus of the health sector in many countries, trauma and accidents have been increasing in these countries.^{1,2} This may arise from greater use of vehicles in LMICs, poor road conditions, and also a lack of public awareness of the importance of road safety and the inability to provide first aid to the victims.³ Based on World Health Organization (WHO; Geneva, Switzerland) data, 90% of global injuries occur in LMICs and are the cause of approximately 5.8 million deaths annually.⁴ Poor prehospital care might be one of the causes of this high number of deaths; this is because the morbidity and mortality of road traffic accidents can be reduced by establishing well-organized prehospital care/Emergency Medical Services (EMS)⁵⁻⁷ and trauma care facilities.^{8,9} Furthermore, the prehospital emergency care is not always needed by traumatic and obstetric patients,⁴ but non-traumatic emergency patients, such as communicable and non-communicable disease patients, also require prehospital care, including transport to hospital.¹⁰

Armenia	Guatemala	Mongolia	Sri Lanka
Bhutan	Guyana	Morocco	Sudan
Bolivia	Honduras	Nicaragua	Swaziland
Cameroon	India	Nigeria	Syrian Arab Republic
Cape Verde	Indonesia	Pakistan	Timor-Leste
Congo, Rep.	Kiribati	Papua New Guinea	Ukraine
Cote d'Ivoire	Kosovo	Paraguay	Uzbekistan
Djibouti	Lao PDR	Philippines	Vanuatu
Egypt, Arab Rep.	Lesotho	Samoa	Vietnam
El Salvador	Mauritania	Sao Tome and Principe	West Bank and Gaza
Georgia	Micronesia, Fed. Sts.	Senegal	Yemen, Rep.
Ghana	Moldova	Solomon Islands	Zambia

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Table 1. Low-Middle Income Countries

Based on the importance of prehospital care, it is necessary to establish an organized EMS system; however, prehospital care in LMICs has been, and still is, underdeveloped.¹¹

There are several methods for categorizing countries based on their development. The United Nations (UN; New York, New York USA), World Bank (WB; Washington, DC USA), and WHO have different categorization systems. The UN categorizes countries based on Gross National Income, Human Assets Index, and the Economic Vulnerability Index.¹² Based on the UN criteria, there are three categories: developed economies, economies in transition, and developing economies. The WB categorizes countries based on region and income. For the income criteria, there are low-income countries, lower-middle income countries, upper-middle income countries, and high-income countries.¹³ The WHO report describes the countries based on nine indicators of global health, including countries listed alphabetically by regions and income groups with additional information.¹⁴ Similar to the WHO report, this report will use the categorization from the WB. Examples of low-income countries include Afghanistan and Cambodia, where lower-middle income countries include Indonesia and India, upper-middle income countries include Mexico and Malaysia, and high-income countries include Australia, United Kingdom, and the United States.¹⁵

In this report, issues related to the status of an EMS system in LMICs will be described. The countries included as LMICs were based on the WB categorization process and included 48 countries (Table 1). The objective of this study was to investigate the development and status of EMS systems in LMICs.

Report

Study Design

This was a review of medical-related electronic databases to identify EMS systems in LMICs.

Procedure

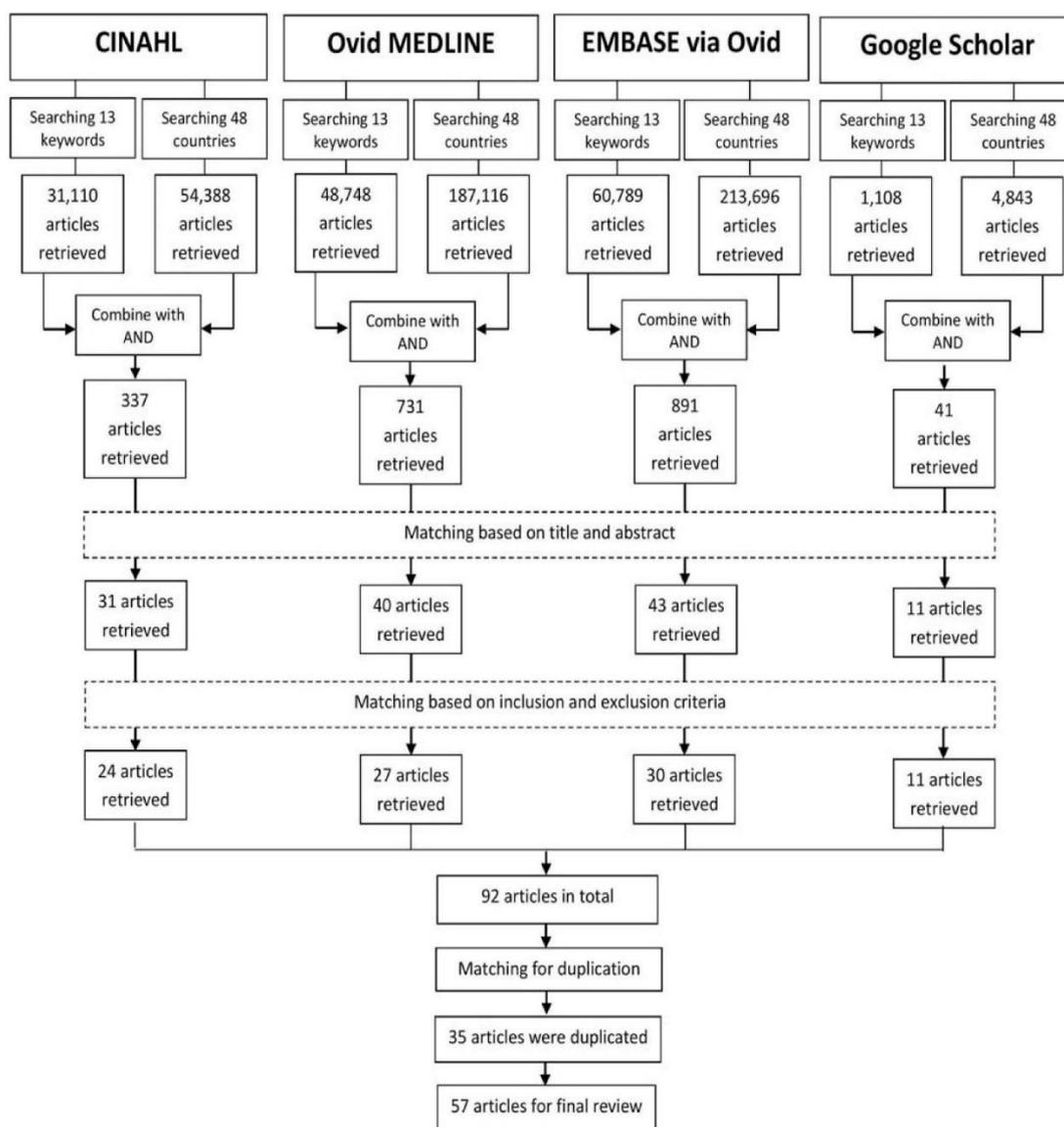
A search was undertaken using the electronic medical databases CINAHL Plus (EBSCO Information Services; Ipswich, Massachusetts USA), EMBASE (Elsevier; Amsterdam, Netherlands),

and Ovid Medline (Ovid Technologies; New York, New York USA) from their commencement date until the end of July 2015. In order to add to the credibility and validity of the review, the search also included grey literature using Google Scholar (Google Inc.; Mountain View, California USA). The search strategy used the following keywords: "prehospital," "pre hospital," "pre-hospital," "out-of-hospital," "out of hospital," "pre hospital care," "EMS," "EMT," "ambulance," "ambulance service," "paramedic," "paramedics," and the 48 countries categorized as LMICs. The search processing used the keywords individually and in combination.

Articles were included if they reported on the establishment of an EMS system, including the funding of the system, the human resources for the EMS system, the prehospital patient demographics, the case load and incident type, prehospital transport mode (type of vehicle and staff configuration), availability of the ambulance, and the obstacles of implementing the EMS system. Articles were excluded if they were not in English or Bahasa Indonesia, letters to editors, focusing on disaster management, a combination of more than one country where at least one country was not a LMIC, and focusing only on in-hospital care or emergency department (ED) care.

Results

Based on the 13 keywords used for the search, there were 31,110 articles identified in CINAHL, 48,748 in Ovid Medline, 60,789 in EMBASE via Ovid, and 1,108 articles in Google Scholar. Those results were then combined with 48 countries and generated 337 articles in CINAHL, 731 articles in Ovid Medline, 891 articles in EMBASE via Ovid, and 41 articles from Google Scholar. Based on the title and abstract, there were 31 articles from CINAHL, 40 from Ovid Medline, 43 from EMBASE via Ovid, and 11 articles from Google Scholar retrieved for further review. After matching based on the inclusion and exclusion criteria, there were 92 articles that met the criteria with 35 duplicated articles removed; this left 57 articles to be reviewed. There were no further articles found from the review of the reference list of the retrieved articles. From those 48 countries categorized as LMICs, there were 16 countries (33.3%) that had



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Figure 1. Articles Retrieved from the Databases.

information about an EMS system. The process of identifying and retrieving the articles is demonstrated in Figure 1 and the summary of the findings can be found in Table 2.

Discussion

This is the first time a literature review has been undertaken to identify the establishment and management of an EMS system in LMICs. Overall, there is a lack of current information about EMS systems in LMICs, and that the information available identified a lack of efficient EMS systems in LMICs.

Availability of the EMS System

The availability of an EMS system among LMICs is varied. Most LMICs lack an organized EMS system, for example, Indonesia,

India, Morocco, Vietnam, Armenia, Nigeria, Ghana, and Sri Lanka.^{5,15-22} Indonesia implemented an EMS system during the establishment of the Safe Community Program in 2000. The program was implemented in order to guarantee that the citizens are safe and healthy by establishing 118 ambulance services in 18 cities in Indonesia.¹⁶ The progress of EMS development in Indonesia seems slow-moving due to financial issues.¹⁶

The 115 emergency call center was launched in 2007 in Morocco, but it was not protected by any legislation and there was no evaluation of the effectiveness of the system.¹⁷ The cost of calling the emergency call center is US\$0.20 with the call received by an intensive care/anesthetics intern station in a hospital ED. The system in Sri Lanka was piloted in 2009 in the Anuradhapura, north central region of Sri Lanka,²³ but there is no published

Information Available	No. of Articles		No. of Countries		Countries
	n	%	n	%	
EMS System	19	33.3	12	25.0	Armenia, Ghana, Guatemala, India, Indonesia, Kosovo, Morocco, Pakistan, Philippines, Sudan, Ukraine, Vietnam.
Human Resources	5	8.8	5	10.4	Armenia, India, Kosovo, Pakistan, Sri Lanka.
Patient Demographic	20	35.1	6	12.5	Ghana, India, Indonesia, Nicaragua, Nigeria, Pakistan.
Injury Type/Case	23	40.4	7	14.6	Armenia, Ghana, India, Indonesia, Nicaragua, Nigeria, Pakistan.
Prehospital Transport	11	19.3	4	8.3	Ghana, India, Nigeria, Pakistan.
Prehospital Education/Training	3	5.3	2	4.2	Armenia, India.
Transfer/Referral	4	7.1	3	6.2	Ghana, India, Nigeria.
Mortality	9	15.8	4	8.3	Ghana, India, Nigeria, Vietnam.
Funding	4	7.1	3	6.2	India, Pakistan, Sri Lanka.
Obstacles/Challenges	13	22.8	5	10.4	Armenia, Ghana, India, Indonesia, Sri Lanka.

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Table 2. Summary of Information Regarding Prehospital Care among LMICs with Published Data
Abbreviations: EMS, Emergency Medical Services; LMICs, low-middle income countries.

article describing the current development of the system in Sri Lanka.

In 1997, Vietnam had no organized EMS system and an ambulance was used for "transport" only.¹⁸ The scoop-and-run approach was used in order to transport the injured patient to hospital using any available vehicle. In 2004, the situation remained the same; an ambulance rarely was used for transporting patients but was used for transporting honored guests.²⁴ However, there was a positive change seen in 2010 when there were Village Health Workers (VHWs) and health volunteers²⁵ used in an EMS role. Nguyen et al²⁵ interviewed 3,000 of the VHWs to assess their capacity. Approximately 31% of the VHWs and volunteers were trained by local hospitals to manage injuries with 16% of them equipped with essential emergency equipment.

India does not have a country-wide organized EMS system. In 2002, there was a project initiated to establish an EMS system in the country.²⁶ However, there were several challenges in establishing an EMS system in India, such as a lack of public awareness and financial issues.²⁶ In 2008, Kumar et al²⁷ investigated the knowledge, attitude, and practice in EMS among resident doctors, consultants, and private practitioners. The study showed that participants had less than adequate knowledge and practice in EMS. In 2010, the EMS system was still unorganized with 43.5% of injured patients being helped by a passer-by and no one waiting for an ambulance.¹⁵ Another similar study also showed that 66.1% patients were transported by private car and not by ambulance.²⁸ The initial 108 Emergency Service in India was established in Andhra Pradesh and managed by GVK Emergency Management and Research Institute (GVK EMRI; Andhra Pradesh, India).²⁹ Then, the project was supported by local government, and in 2011, the other nine states adopted the same model and operated around 2,300 ambulances in those 10 states.²⁹ However, prehospital care in India remains steady where prehospital care coordination only occurs in metropolitan areas and is non-existent in urban and semi-rural areas

with no national guidelines or protocol covering prehospital care.⁹ The establishment of the private ambulance system has become one of EMS system development in India. The Ziqitza Healthcare Limited (Mumbai, India), established in 2005, is one of the private EMS systems in the country.³⁰ It had a call center called 1298 in Mumbai and started the system with 10 ambulances; then in 2009, the system was expanded to the other two states, Alleppey and Kottayam, with the addition of five Advanced Life Support (ALS) and 10 Basic Life Support (BLS) ambulances.³⁰

According to Ahidjo et al, Nigeria also lacks an organized prehospital care system and has obsolete trauma centers and less-qualified trauma teams.⁵ In 2003, the nearest ambulance service in some parts of Ghana was over 100 miles away and there was no dispatch center for coordination and dispatching of an ambulance.³¹ Then in 2004, the EMS system in Ghana, called the National Ambulance Service (NAS), was established by providing seven pilot ambulance stations in collaboration with the Fire Service and other hospital-based ambulances; by 2014, NAS was available in every district of the country.³² In Yerevan, Armenia, the city had the 103 emergency call center with one dispatch center and eight sub-centers in 2013.³³ The EMS system in the city involved 650 staff members and 200 physicians with 35 ambulances; 10 of the ambulances were resuscitation ambulances.³³ There was a similar situation in Khartoum, Sudan. The state had one central, 999 call center, and involved 37 ambulances and 29 hospitals.³⁴

The Ukraine was part of the Soviet Union, and the EMS systems appears to be well organized as a result.³⁵ The Ukraine gained independence from the Soviet Union in 1991, with the Ukraine taking over the EMS system, which was founded in 1902.³⁵ The EMS system in the Ukraine was one of the first systems in the world to perform home electrocardiograms (ECGs), prehospital thrombolysis, and prehospital defibrillation. Definitive care often is conducted in the field and it is not expected

that the patient will be transported to hospital routinely. The research was undertaken in three main Ukrainian cities, Kiev, Vinnitsya, and Gnivn. Most of the EMS systems are computerized with nurses as the dispatchers.

Pakistan established an EMS system in the mid-2000s. Rescue 1122 was launched in 2004 and was centered in the Punjab state.¹¹ The system has now been implemented in other provinces in Pakistan. Karachi, the largest city in Pakistan, has decentralized ambulance services which were operated by non-profit organizations or were hospital-based.³⁶ There were two ambulance services in Karachi, the Edhi Foundation and Aman Foundation ambulance services.³⁶ The Edhi Foundation, established in 1955, provides ambulances with no trained staff nor emergency equipment inside the ambulance; the Aman Foundation, established in 2009, provides ambulance services with medical equipment and trained medical technicians, drivers, and doctor upon request.³⁶ Nevertheless, there are seven keys of a successful EMS system in Pakistan: (1) providing a legislative framework; (2) human resources management; (3) establishing an organizational structure; (4) strategic planning of ambulance station locations; (5) organizing prehospital care; (6) expanding the scope of service; and (7) quality monitoring.¹¹ By applying these methods, the EMS can maintain an average seven minute response time in all 35 districts within the Punjab state.¹¹ The success of Pakistan in establishing an EMS system is due to several reasons: (1) using local manufacturing products and equipment, especially for the vehicles; (2) strategic planning for ambulance station locations, which is based on response time rather than target population; (3) assistance from developed countries; (4) adopting the teaching and training to meet local needs; and (5) using a single command structure for all first responders, ambulance, rescue, and fire services.¹¹

Funding

Funding is one of the main obstacles in establishing a well-organized EMS system. Since most LMICs do not have an organized EMS system, most of the prehospital care cost is a citizen's responsibility.¹⁵ Due to the high cost of using prehospital care services, people in Ghana seek other forms of transport and do not seek help from medical institutions but seek to use traditional healing methods.³¹ Even in the Ukraine, with its comparatively well-organized EMS system compared to other LMICs, after the breakup of the Soviet Union, the Ukraine still has a low budget for maintaining the EMS system, approximately US\$4 million annually.³⁵ The government in Sri Lanka is not the only source of funds for the developing EMS system. The EMS system in Sri Lanka was developed by support from other sources, such as Sarvodaya (a community-based organization; Moratuwa, Sri Lanka), Red Cross (Colombo, Sri Lanka), private hospitals, private ambulance service, and foreign government aid.²²

Assistance from developed countries is necessary to enhance the quality of prehospital care in LMICs. There was support for the Punjab state in Pakistan from the United States and United Kingdom in establishing their EMS system. To support the staffing of the EMS system in the Punjab, the United States provided four months of training for more than 6,000 rescuers costing almost US\$1.5 million.¹¹ Pakistan also expanded the scope of service into the fire services with assistance from the United Kingdom, which provided modern fire appliances and formal training for firemen.¹¹ Another advantage gained from international support is that the Sri Lankan first responders/paramedics can take the Australasian

Registry of Emergency Medical Technicians (EMTs) regional exam because the EMT training is provided by the US.²² Similarly, India had support from the George Washington University (Washington, DC USA) in the US, which assisted in launching the first EMS system in 2002. This support consisted of EMT class teaching, designing and procuring ambulances, equipment for the health clinic, and a field delivery management system.²⁶

Human Resources: Availability

Human resources are varied among LMICs, and some employ physicians, nurses, or paramedics; however, there is only a driver in the ambulance in certain countries. Most LMICs lack the appropriate human resources for efficiently organized prehospital care and systems. Even though some countries already have training, most LMIC prehospital care providers are unable to provide it.¹⁵ In Morocco, even though an ambulance is staffed by a driver and two paramedics, only one out of three is trained in prehospital care.¹⁷ Similar to Morocco, EMS staff in Nigeria also are inexperienced and overworked,⁵ and emergency assistants employed in the ambulances in Khartoum, Sudan had limited medical training.³⁴ In Pakistan, each ambulance includes a driver and two EMTs.¹¹ In 1997, an ambulance in Vietnam included a driver who had little or no ability to manage patients in the prehospital setting,¹⁸ while in 2010, the availability of VHWs and health volunteers had improved the prehospital care available. Ten percent of VHWs had experience in providing care to road traffic injured patients and 36.7% had experience in medical emergency care.²⁵ Similar to Vietnam, ambulance staffing in Nicaragua consists of a driver with no training, who was paid less than US\$100 per month for three to four 24-hour shifts a week,²¹ with no further information regarding other staff for ambulance services.

In contrast, the Ukraine ambulance staff includes specially trained physicians and nurses.³⁵ The EMS dispatchers are nurses and a physician who is always present in the dispatch center. Depending on the area, there are 26 to 145 prehospital teams consisting of physician-nurse teams or nurse-nurse teams, which are available 24 hours a day.³⁵ There are a large number of employees paid a low salary in the Ukraine.

What can be learned from other countries is the empowering of the community. The VHWs and health volunteers in Vietnam can enhance the quality of prehospital care. It is not only laypersons that can be empowered in the community; military medics also can be empowered. In the Sudan, 40 hours of training was undertaken to prepare the military medics as prehospital care providers.³⁷ The training had a positive influence in improving participants' knowledge and skills, especially in wound care, caring for the patient with a hemorrhage, and managing the patient with head trauma.

Education for EMS Personnel

The education system for prehospital care providers is varied among the different countries. In Morocco, there is a paramedic school consisting of two years basic training and one year on-the-job training with 50% of the paramedics having resuscitation skill training.¹⁷ In Armenia, there was no formal training in emergency medicine or prehospital care for EMS staff.¹⁹ Most of the EMS providers in Armenia did on-the-job training and developed their own style and approach of learning; thus, their expertise is by experience.¹⁹ In Ghana, EMS personnel were trained in cardiopulmonary resuscitation (CPR), oxygen therapy, bandaging, and splinting, but without any formal certification.³¹ Even though

Information Available	No. of Countries		No. of Articles		Countries
	n	%	n	%	
Financial Problem	4	8.3	6	8.8	Armenia, Ghana, India, Indonesia, Sri Lanka.
Lack of Public Awareness	4	8.3	4	7.1	Armenia, Ghana, India, Indonesia.
Cultural Issues	2	4.2	3	5.3	Ghana, Indonesia.
Infrastructure	3	6.2	3	5.3	Armenia, Ghana, Indonesia.

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Table 3. Obstacles in Implementing EMS system in LMICs
Abbreviations: EMS, Emergency Medical Services; LMICs, low-middle income countries.

there are no data regarding prehospital education in Sri Lanka, the knowledge of EMTs in the country was good.³⁸

As mentioned previously, support from developed countries is essential in improving the knowledge and skills of EMS personnel by providing training in prehospital care. Based on Pakistan's experience, support from developed countries can include training in prehospital care, emergency dispatch, documentation, plus water and fire rescue.¹¹ Similarly, support from the George Washington University in the US allowed India to implement EMT education as an initial step to establishing the EMS system in 2002. The initial focus was on basic CPR, patient assessment, lifting and moving, anatomy and physiology, safety, and cardiology.²⁶

The Case and Type of Transportation

Trauma cases are the major incidents in LMICs; the majority of prehospital trauma cases were related to traffic incidents.^{3,20,24,28,39} In Armenia, 38% of cases were hip fractures, 31% knife wounds, and 29.5% neuroses and psychosis.¹⁹ Fifty percent of trauma cases were traffic-related injury in Ghana and falls were the second highest of the prehospital cases.²⁰ This was similar in India²⁸ where 73% of accidents in India were motorbikes and 14% of them were influenced by alcohol.²⁸ Burn injuries also accounted for high incidents among LMICs.^{20,28} In the majority of trauma incidents, between 60% and 90% of patients were males^{7,15,40-45} in their 30s.^{28,42,43} In Ghana, most patients were transported by taxi from the scene to the hospital,^{20,31} while in India and Nigeria, most patients were transported by private car.^{5,28} In Pakistan, which has a more developed prehospital care system, the ambulance was the most used prehospital transportation in the country.³⁹ Most patients were transported within an hour of the incident to the nearest ED.^{20,43}

Characteristic of the Ambulances

The characteristics and effectiveness of the ambulances varied among LMICs. In 2000, La Trinidad in Nicaragua had two ambulances and one untrained driver.²¹ One ambulance was an old white pick-up truck which was used primarily for transport, and another ambulance was donated by UNICEF (New York, New York USA), which was more suitable but still without oxygen or suction equipment. In Morocco, the ambulance is used for transporting severe trauma patients with three out of 15 ambulances equipped with resuscitation equipment and one ambulance well-equipped for use during major social/sporting events.¹⁷ The other 12 ambulances were ordinary ambulances which were used for transport and equipped with first-aid

equipment only. In the Ukraine, most ambulances were equipped with a cardiac monitor/defibrillator with some ambulances using an ECG machine which could transmit the ECG to the hospital from the scene.³⁵ However, in Gnivan, another part of the Ukraine, there was only one older ambulance which had no cardiac monitor/defibrillator, and other equipment, medication, and trauma and obstetric boxes were stored at the base station and would be taken to the ambulance as needed.³⁵

Obstacles

The establishment of a well-organized EMS system in LMICs had many obstacles. Financial resources and a poverty level of income are the two biggest problems.^{16,23,26,31,46} Lack of funding may lead to insufficient medication, supplies, and equipment for the services and a large out-of-pocket payment by community.⁴⁶ Thirty four percent of people involved in a study of the services in India mentioned that they would not call an ambulance because it cost too much.³⁰ The lack of public awareness of the need for an EMS system also influences the implementation of an EMS system.^{26,47} A study in Ghana found that only 22 (4.5%) people involved in the study had ever called an ambulance for emergency cases because 77.4% of them believed that a taxi was faster than an ambulance.⁴⁸ Lack of general emergency knowledge among the society, including performing CPR, is one of the issues faced by Armenia.⁴⁶ Cultural issues where people believe that any accident or diseases is the "will of God" must be understood and accepted,¹⁶ along with the people's belief and use of more traditional healing methods compared to modern health care.³¹ In Ghana, people (23% of respondents in the study) believed that ambulances were used to transport corpses rather than emergency patients.⁴⁹ This misperception may have led to low ambulance utilization in Ghana.⁴⁹ The condition of the roads, the traffic volume, and lack of road infrastructure are also obstacles to prehospital care in LMICs.^{31,46,47} The summary of the obstacles faced by LMICs in implementing EMS system can be seen in Table 3.

Limitations

This study is potentially limited by several articles found being more than 10 years old. It is possible that the situations have changed in these countries; therefore, the current situation in most LMICs remains unknown. The study also is potentially limited by the exclusion of non-English articles, as some theoretically relevant articles may have been missed.

Conclusion

Little is known regarding EMS systems of LMICs, but for those with published data, the review conclusions can be made. The implementation of an EMS system is varied among LMICs and dependent on the characteristic of each country. In general, based on information published in the databases reviewed, most LMICs lack an organized EMS system with most ambulances used only for transport and not as an emergency care vehicle.

The most advanced EMS system was implemented by the Ukraine, which resulted following the break-up of the Soviet Union. The least advanced countries have no EMS system and rely on an unorganized system of private cars or other transport to take patients to hospital. Financial issues and lack of training of staff are the most common problems faced by LMICs, with support from developed countries a necessity for the sustainability of the system.

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3.3 Chapter Summary

The review of the literature showed that information on EMS systems in LMICs was limited. The published data showed that most LMICs lacked an organised EMS system. The Ukraine had the most advanced EMS system due to it being part of the former Soviet Union. Several countries, such as Sri Lanka and Pakistan, had piloted an organised EMS system in one city during the past decade. Similar to those countries, Indonesia launched its 119 EMS system in July 2016 about 10 years after ending the previous 118 EAS system. The literature also illustrated that most LMICs lacked organised prehospital care providers, and most of these providers had limited training in prehospital care, although support from developed countries had been shown to enhance the competencies of health workers in prehospital care. Indonesia had the same problems with human resources where specific prehospital care providers were unavailable. Nurses working in the EDs at hospitals or *puskesmas* were responsible for staffing ambulances but had no formal prehospital education. This study addressed the research question, “What is the status of the prehospital care system in Indonesia?”

The research examined prehospital human resources and the prehospital care system. Studies One and Two investigated the status of prehospital care human resources, while Study Three investigated the prehospital care system in Indonesia. Ethical approval has been granted for all three studies both from Monash University Human Research Ethics Committee, Australia (Appendix A) and the Health Research Ethics Committee of Ministry of Health of Indonesia (Appendix B). The following two chapters describe the results regarding the two main areas of interest of this research. The results of Studies One and Two are described in the following chapter, which explored whether nursing graduates were work ready to be ambulance nurses and investigated the level of perceived knowledge, attitudes, and practice of ambulance nurses in prehospital care in Malang, Indonesia.

Chapter 4 Human Resources in Prehospital Care

4.1 Introduction

In this study, it was important to explore whether nursing graduates were work ready to staff ambulances at the completion of their undergraduate degree, acknowledging that most hospitals and *puskesmas* would roster an experienced emergency nurse as an ambulance nurse. In most cases, the experienced nurse has had no further training in prehospital care but has had more time as a nurse. Studies One and Two of this research investigated this issue. Two perspectives of human resources, education and clinical practice, were examined. At the time of this study, there were no national regulations for nurses staffing ambulances, in terms of minimum requirements or their career pathway. Therefore, nurses staffing ambulances may have varied competence levels in their knowledge, attitudes, and practice of prehospital care. As the prehospital care content is limited in nursing education, the competence of those nurses in prehospital care was likewise expected to be limited. Thus, Study Two examined the perceived knowledge, attitudes, and practice of prehospital care among ambulance nurses in Indonesia.

4.2 Work Readiness to be an Ambulance Nurse among Nurse Graduates

A cross-sectional study using a paper survey was utilised for Study One, which involved 394 Bachelor of Nursing graduates. A modified questionnaire from a previous study by O'Brien, Moore, Hartley, and Dawson (2013) was tested prior to its use in this study (Appendix C). Posters about the study were displayed on the notice boards of the nursing schools to recruit participants. Furthermore, flyers distributed during the national exam helped recruit more participants. As this was the first study of its kind in Indonesia, the results were expected to inform the preparation of nursing students to staff ambulances. The performance of nurses staffing ambulances depends on their

education and training. Without sufficient education and training, nursing graduates might not feel confident staffing ambulances due to a lack of relevant knowledge, skills, and experience.

Journal of Nursing Education

Work Readiness to be an Ambulance Nurse among Nursing Graduates in Indonesia --Manuscript Draft--

Manuscript Number:	JNE-2017-564
Full Title:	Work Readiness to be an Ambulance Nurse among Nursing Graduates in Indonesia
Article Type:	Major Article
Order of Authors:	Suryanto Suryanto, M.Nurs. Malcolm Boyle, PhD Virginia Plummer, PhD
Order of Authors Secondary Information:	
Abstract:	<p>Background The knowledge and skills of prehospital care among nurses in Indonesia are essential because nurses are required for staffing ambulance services. However, there is insufficient prehospital content in the curriculum. This study investigated the work readiness of nursing graduates to work as an ambulance nurse.</p> <p>Method A cross-sectional study consisting of a paper-based survey.</p> <p>Results There were 394 new nursing graduates from Malang area involved in the study. Participants' score in the "ethics and legal responsibilities" domain was the highest and "practical skills" domain was the lowest compared to the other six domains. The "practical skills" domain was also significantly different based on the time from BN graduation and the length of experience as a nurse.</p> <p>Conclusions Despite the lowest levels of "practical skills" domain, participants' score of other domains related to work readiness were sufficient. Therefore, emphasizing prehospital practical skill content in nursing education in Indonesia is essential.</p>

26 **Introduction**

27 The development of the healthcare system in Indonesia is unique due to its population and
28 archipelago. There are more than 250 million people living in the country (Kementerian
29 Kesehatan Republik Indonesia, 2015) on more than 13,000 islands, from diverse cultural
30 backgrounds, races, and religions (Shields & Hartati, 2003). The unique characteristics of the
31 country also impinge on the development of nursing education. The majority of higher
32 nursing education in Asian countries are four year programs, however in Indonesia they are
33 five years, consisting of four years in the academic/class setting and one year in the clinical
34 setting (Shields & Hartati, 2003). There are Diploma, Master, specialist and PhD qualified
35 nurses in Indonesia (Persatuan Perawat Nasional Indonesia, 2016). The majority of nurses in
36 Indonesia are Diploma qualified, for example, there were 3,364 diploma qualified nurses and
37 297 bachelor qualified nurses in East Java Province in 2012 (Dinas Kesehatan Provinsi Jawa
38 Timur, 2013). In the future the majority will be bachelor qualified with a movement towards
39 Bachelor of Nursing (BN), also called *Ners*, as the minimum requirement of registration as a
40 nurse in Indonesia.

41 The undergraduate nursing education in Indonesia is divided into two components, BN
42 program and nursing professional program (clinical) (Kolegium Ners Indonesia, 2015). The
43 BN is the academic stage and students will be awarded a BN while the professional program
44 is a clinical program and students will be awarded a *Ners* on completion of both programs.
45 These two programs are separate but in combination form a complete *Ners* program, with it
46 being compulsory for students to take the nursing professional program after finishing the BN
47 program. The BN program is four years of study (eight semesters) while the professional
48 program (clinical) is a two to three semesters of study (Kolegium Ners Indonesia, 2015).

49 Those totals ten to eleven semesters of study are for BN programs, also known as Program A,
50 where the students require year 12 high school for course entry. Several other universities and
51 nursing education institutions have another program, called Transferred BN program or
52 Program B where the students require Diploma of Nursing for course entry. For Program B,
53 the duration of the program is varied and based on each institution's regulations. In general,
54 Program B consists of three semesters of the academic stage and two semesters of the
55 professional stage (Fakultas Keperawatan Universitas Airlangga, 2009).

56 The nursing education curriculum for BN Program A and B in Indonesia focuses on in-
57 hospital care, including emergency care. The national curriculum shows that emergency
58 nursing subjects are limited during the academic and nursing professional stages (Kolegium
59 Ners Indonesia, 2015). There are no prehospital care specific topics, but there are topics
60 which may be related to prehospital care such as primary and secondary assessment, triage,
61 splinting, airway, cervical management, needle decompression, and Basic Cardiac Life
62 Support (BCLS) (Kolegium Ners Indonesia, 2015). Therefore, nursing graduates in Indonesia
63 might not have sufficient knowledge and/or skills related to specific aspects of prehospital
64 care.

65 Knowledge and skills of prehospital care among nurses in Indonesia are essential because
66 nurses who work in the emergency departments (EDs) of hospitals and community health
67 centers, called *puskesmas*, are required to staff for ambulance services in Indonesia.
68 Currently, there is no specific prehospital health profession such as paramedics or Emergency
69 Medical technicians (EMTs) in Indonesia. When there is a need for ambulance service,
70 ambulance nurses with an ambulance and driver will be dispatched to the scene. In certain
71 cases, such as life threatening conditions, large hospitals also deploy medical residents with
72 the ambulance. However, this is uncommon practice. The ambulance nurses are expected to

73 be able to manage prehospital patients, including assessment, diagnosis, treatment and
74 stabilization at the scene and during transport. If needed, those ambulance nurses might have
75 a phone or radio consultation with the doctor in the EDs or *puskesmas*. There is no post
76 qualification education for nurses working on the ambulance.

77 The prehospital system in Indonesia is still under-developed. The current 119 Emergency
78 Medical Services (EMS) was launched in July 2016 after more than a decade of the cessation
79 of the previous 118 Ambulance Emergency Services (Dzulfiqar & Riza, 2016). During the
80 launch, the 119 EMS system only available at 27 locations in Indonesia, however, based on
81 national regulation, the system should be applied in all areas within two years after the launch
82 (Kementerian Kesehatan Republik Indonesia, 2016). At present, ambulance services in most
83 areas in Indonesia are either hospital-based or *puskesmas*-based.

84 The national regulation about 119 EMS system does not cover the qualification of human
85 resources working on ambulance. There is no standardized requirement for nurses working
86 on the ambulances. Since there is no formal prehospital education for nurses who work on
87 ambulances and the description of prehospital care topics is not available in the national
88 nursing curriculum, the knowledge and skills of prehospital care among nursing graduates in
89 Indonesia are unclear.

90 **Study Aim**

91 This study investigated the work readiness of nursing graduates in Indonesia to work on an
92 ambulance as an ambulance nurse.

93 **Methods**

94 *Design*

95 This was a cross-sectional study consisting of a paper-based survey investigating the work
96 readiness of nursing graduates in Indonesia to be an ambulance nurse.

97 *Participants*

98 New BN graduates in Malang and surrounding areas were invited to participate in the study.
99 There is no published data on the number of nurses who graduate annually in Indonesia,
100 however, it was predicted that in 2006 there were 6,000 BN students who graduated from 26
101 higher nursing education institutions in Indonesia (Mulyati, 2016). The data was also not
102 available for the Malang area, but, as an example, there were 373 nursing students at
103 Brawijaya University in the 2008/2009 academic year and 650 in 2012/2013 academic year
104 (Universitas Brawijaya, 2013). As Brawijaya University is the largest university in the area,
105 the number of BN graduates in other institutions in the Malang area may be less in number.
106 New nursing graduates in this study means the participant has graduated within the last two
107 years as the researchers were interested in the knowledge and skills of the novice.

108 *Setting*

109 This study was limited to BN graduates in the Malang area and surroundings, East Java
110 Province, Indonesia. Malang consists of three areas, Malang City, Malang Regency and Batu
111 City covering more than 3,800 Km² and a population of approx. 3.8 million (Kementerian
112 Dalam Negeri Republik Indonesia, 2014a, 2014b, 2014c). Current data from the Association
113 of Indonesian Nurse Education Centre shows in 2016 that there are 288 BN education

114 institutions in Indonesia with eight of them in the Malang area: Brawijaya University,
115 Muhammadiyah University, Widyagama University, Tribhuwana Tungadewi University,
116 Stikes Kepanjen, Stikes Kendedes, Stikes Maharani, and Stikes Widya Cipta Husada
117 (Asosiasi Institusi Pendidikan Ners Indonesia, 2016).

118 ***Ethical Consideration***

119 Ethical approval had been granted by two ethics committees, the XXX Research Ethics
120 Committee, ethics approval number CF14/3742 – 2014001963 and YYY Research Ethics
121 Committee, ethics approval number LB.02.01/5.2/KE.451/2014.

122 ***Data Collection***

123 A questionnaire, which has been adapted from a previous study by O'Brien et al. (2013), was
124 used in this study. The original questionnaire was assessed by five paramedic academics and
125 educators in Australia for content validity. However, there are no published results about the
126 content validity of the original questionnaire. The original questionnaire was modified to suit
127 the Indonesian setting for nursing. Specific Australian context items in the original
128 questionnaire, such as Australian College of Ambulance Professionals as a professional
129 association and Victorian Ambulance Counselling Unit as a peer support unit, were adjusted
130 into the Indonesian settings. This questionnaire was used because there is no specific
131 questionnaire available for measuring nursing graduates' work readiness to be an ambulance
132 nurse. Furthermore, the original questionnaire was used to measure the readiness to work on
133 ambulance among paramedic students while the modified questionnaire used in this study
134 was used to measure the readiness to work on ambulance among nursing graduates. Since
135 there is no paramedic profession and nurses are the main ambulance crew in Indonesia, the
136 original questionnaire with modification would be appropriate to be used in this study.

137 The modified questionnaire consists of two parts, demographic data and the survey questions
138 with Likert Scale statements. There are 64 Likert-Scale statements with eight domains of
139 work readiness; theoretical knowledge, clinical skills, practical skills, interpersonal skills,
140 communication with colleagues and other professionals, coping skills, lifelong learning, and
141 ethics and legal responsibilities. The Likert-Scale was a six point scale ranging from “very
142 inadequately”, “inadequately”, “somewhat inadequately”, “somewhat adequately”,
143 “adequately”, and “very adequately”. The modified questionnaire was tested during a pilot
144 study in December 2015 involving 12 nurse graduates in Indonesia with one of the surveys
145 excluded during the analysis due to being incomplete. The Cronbach's Alpha score was 0.946
146 meaning the questionnaire has high internal consistency.

147 Convenience sampling was used in this study. Seven BN schools in the Malang area were
148 involved in the study. Posters describing the study had been put on the notice board of all
149 seven nursing schools to advertise of the study with permission of the Head of School of
150 every institution. The posters included the contact details of the investigator (S). Potential
151 participants interested in the study contacted the investigator and then the investigator
152 following-up by phone and sending the questionnaire pack by email to the potential
153 participants. The investigator then met the participants so that the participants could put the
154 completed anonymous questionnaires into a sealed box provided by the investigator.

155 Due to small number of participants, the recruitment strategy was changed by distributing the
156 flyers following national competency exams. The flyers were distributed, with permission, so
157 that examinees could collect them after an information session which was held a day prior the
158 exam. If they were interested, they would contact the investigator for a questionnaire pack.
159 The participants could return the completed questionnaire by putting it into a sealed box

160 provided. The new strategy was successful in recruiting more participants. In total, there were
161 394 participants involved in the study.

162 ***Data Analysis***

163 Data analysis was undertaken using SPSS (Statistical Package for Social Sciences version 22,
164 IBM Corporation, Armonk, New York, U.S.A). Descriptive and inferential statistics were
165 used in this study. Descriptive statistics are used to summarize the demographic data; gender,
166 age, type of BN program, BN institutions and year of graduation, diploma in nursing
167 institutions and year of graduation, length of nursing education, and job and training
168 experience. Descriptive statistics were also used to summarize the Likert Scale responses.
169 The Likert-Scale statements of the questionnaire were converted into numbers, “one to six”
170 for “very inadequately to very adequately”. The range for the responses was from six to 36
171 for “theoretical knowledge”, 15 to 90 for “clinical skill”, seven to 42 for “practical skill”, 11
172 to 66 for “interpersonal skill”, eight to 48 for “communication with colleagues and other
173 professionals”, seven to 42 for “coping skill”, six to 36 for “lifelong learning”, and four to 24
174 for “ethics and legal responsibilities”.

175 Inferential statistics were used to measure the differences in work readiness domains among
176 participants based on the participants’ demographic data. The data was initially tested for
177 normality using the Kolmogorov Smirnov test. For the non-normally distributed data, the
178 Mann-Whitney U and Kruskal Wallis tests were used. Those two tests are non-parametric
179 test and were used in order to investigate the differences of participants’ responses based on
180 two categories or more. Results were considered statistically significant if the *p* value was
181 <0.05 and confidence interval (CI) are 95%.

182 **Results**

183 There were 394 participants who returned the questionnaires, however, 46 of the
184 questionnaires were incomplete and were excluded from the data analysis leaving 348
185 questionnaires for further analysis.

186 *Demographic Characteristics*

187 Table 1 shows the demographic characteristics of the participants. More than half of the
188 participants, 216 (62.1%), were female with the average age of all participants' 24.4 years. A
189 majority of participants graduated from Program A and graduated from nursing institutions
190 outside the Malang area, 307 (88.2%) and 202 (58%) respectively. More than half of the
191 participants, 195 (56%), were graduated less than one year (2015) and on average,
192 participants had spent 5.6 years in nursing education. For participants who graduated from
193 Program B, a majority of them (17 out of 40 participants, 42.5%) graduated from Diploma of
194 Nursing institutions outside the Malang area. On average, participants had experience as a
195 nurse for 18 months and had experience as an emergency nurse for six months, including
196 undertaking at least one training program.

197

Table 1. Participants' demographic

	Characteristics	n (%)	Mean (SD)
Gender	Male	131 (37.6)	N/A
	Female	216 (62.1)	
	Not mentioned	1 (0.3)	
Age (years)	22-23	111 (31.9)	24.4 (2.8)
	24-25	178 (51.1)	
	26-27	37 (10.6)	
	28-29	7 (2.0)	
	>29	3 (0.9)	
	Not mentioned	12 (3.4)	
Type of bachelor program	Program A	307 (88.2)	N/A
	Program B	40 (11.5)	
	Not mentioned	1 (0.3)	
BN institutions	University A	117 (33.6)	N/A
	University B	25 (7.2)	
	Others	202 (58.0)	
	Not mentioned	4 (1.1)	
Year of BN graduation	2013	20 (5.7)	N/A
	2014	113 (32.5)	
	2015	195 (56.0)	
	Not mentioned	20 (5.7)	
Diploma of Nursing	Institution A	5 (1.4)	N/A

institutions	Institution B	2 (0.6)	
	Institution C	3 (0.9)	
	Institution D	1 (0.3)	
	Institution E	1 (0.3)	
	Institution F	2 (4.9)	
	Others	17 (4.9)	
	Note mentioned	317 (91.1)	
Length of nursing	4	5 (1.4)	5.6 (3.9)
education (years)	5	308 (88.5)	
	6	10 (2.9)	
	7	2 (0.6)	
	9	20 (5.7)	
	Not mentioned	3 (0.9)	
Experience as a nurse (months)	0	36 (10.3)	18.1 (38.5)
	1-6	47 (13.5)	
	7-12	33 (9.5)	
	>12	22 (6.3)	
	Not mentioned	210 (60.3)	
Experience as ED nurse (months)	0	63 (18.1)	5.9 (19.2)
	1-6	11 (3.2)	
	7-12	14 (4.0)	
	>12	6 (1.7)	
	Not mentioned	254 (73.0)	

Training experience	0	99 (28.4)	1.3 (1.7)
(programs/courses)	1	153 (44.0)	
	2	58 (16.7)	
	3	14 (4.0)	
	4	8 (2.3)	
	6	5 (1.4)	
	7	2 (0.6)	
	9	9 (2.6)	

199 ***Work Readiness to be an Ambulance Nurse***

200 The mean score of each domain can be seen in Table 2. It can be seen from the table that
 201 participants' score of "ethics and legal responsibilities" domain was the highest (82.1%) and
 202 "practical skills" domain was the lowest (65.5%) compared to the other six domains.

203

Table 2. Mean score of eight domains of work readiness

Domains	Mean (SD)	% of maximum score
Theoretical knowledge	25.3 (4.2)	70.3
Clinical skills	69.8 (8.1)	77.5
Practical skills	27.5 (6.0)	65.5
Interpersonal skills	50.9 (6.1)	77.1
Communication with colleagues and other professionals	36.9 (4.9)	76.9
Coping skills	32.8 (3.9)	78.1
Lifelong learning	27.2 (3.9)	75.5
Ethics and legal responsibilities	19.7 (2.1)	82.1

205

206 The comparison of mean scores for the eight domains based on the participants' demographic
 207 characteristics can be seen in Table 3, Table 4, and Table 5. It can be seen from the tables that
 208 participants who were 29 years of age or more and who graduated in 2013 had the highest
 209 scores in all eight domains of the questionnaire. The tables also show that male graduate
 210 nurses had higher scores for seven out of eight domains of the questionnaire. Compared to the
 211 other five domains of the questionnaire, there was no significant difference for participants'
 212 "communication with colleagues and other professionals", "coping skills", and "ethics and
 213 legal responsibilities" domains.

214 **Table 3. Mean scores of "theoretical knowledge" and "lifelong learning" domains based**
 215 **on demographic data**

Characteristics		Theoretical knowledge		Lifelong learning	
		Mean (SD)	<i>p</i> value	Mean (SD)	<i>p</i> value
Gender	Male	25.94 (4.4)	0.063 ^a	27.69 (3.9)	0.117 ^a
	Female	24.89 (4.0)		26.95 (3.8)	
Age (years)	22-23	24.97 (3.8)	0.406 ^b	26.50 (3.7)	0.252 ^b
	24-25	25.48 (4.3)		27.51 (3.9)	
	26-27	25.49 (4.1)		27.65 (3.7)	
	28-29	24.00 (3.5)		27.43 (2.1)	
	>29	29.33 (0.6)		30.00 (1.0)	
Type of bachelor program	Program A	25.27 (4.2)	0.602 ^a	27.18 (3.9)	0.558 ^a
	Program B	25.53 (4.1)		27.60 (3.6)	
BN institutions	University A	24.37 (3.6)	0.934 ^b	26.99 (3.4)	0.402 ^b
	University B	24.64 (6.3)		26.92 (4.9)	
	Others	25.34 (4.2)		27.36 (3.9)	
Year of BN graduation	2013	27.75 (4.9)	0.016^b	29.60 (3.8)	0.025^b
	2014	25.18 (3.6)		27.30 (3.4)	
	2015	24.91 (4.3)		26.85 (4.0)	
Diploma of Nursing institutions ^c	Institution A	25.60 (4.2)	0.598 ^b	28.20 (2.2)	0.765 ^b
	Institution B	28.50 (2.1)		28.50 (0.7)	
	Institution C	24.33 (1.5)		27.67 (1.2)	
	Institution F	17.50 (13.4)		21.50 (9.2)	
	Others	26.24 (2.5)		28.12 (2.9)	
Length of nursing education (years)	4	25.40 (4.6)	0.959 ^b	26.40 (2.3)	0.453 ^b
	5	25.30 (4.3)		27.19 (3.9)	
	6	25.80 (4.9)		28.10 (3.5)	
	7	23.50 (4.9)		24.00 (1.4)	
	9	25.25 (2.1)		27.95 (2.2)	
Experience as a nurse (months)	0	25.42 (4.2)	0.306 ^b	26.97 (3.7)	0.206 ^b
	1-6	24.70 (3.6)		27.21 (3.1)	
	7-12	26.73 (4.0)		28.58 (3.8)	
	>12	25.14 (5.8)		27.64 (5.0)	
Experience as ED nurse (months)	0	25.38 (3.9)	0.093 ^b	27.62 (3.3)	0.050 ^b
	1-6	25.27 (5.1)		29.09 (2.9)	
	7-12	26.21 (3.5)		26.93 (3.6)	
	>12	22.50 (6.5)		24.50 (6.0)	
Training experience (programs/courses)	0	24.69 (4.3)	0.628 ^b	26.92 (3.9)	0.992 ^b
	1	25.46 (4.1)		27.35 (3.7)	
	2	25.60 (3.8)		27.29 (3.7)	
	3	26.93 (4.0)		27.86 (3.9)	
	4	25.38 (4.6)		27.38 (5.7)	
	6	23.20 (6.5)		25.80 (7.0)	
	7	27.50 (3.5)		26.00 (4.2)	
	9	25.00 (3.7)		28.22 (2.9)	

216 ^aTested using Mann-Whitney ^bTested using Kruskal Wallis ^cData were omitted during data
217 analysis due to insufficient information includes Institution D and E for diploma institutions

218 Table 3 shows that the highest scores of “theoretical knowledge” and “lifelong learning”
219 domains were attained by male participants and participants who were greater than 29 years
220 of age. Participants graduating from Program B, nursing education institutions outside the
221 Malang area, graduated in 2013, had six years of nursing education, practicing nurse for
222 seven to 12 months had the highest scores for “theoretical knowledge” and “lifelong
223 learning”. The table also shows that participants undertook their diploma of nursing course at
224 Institution B had the highest scores for “theoretical knowledge” and “lifelong learning”. It
225 can also be seen from the table that “theoretical knowledge” and “lifelong learning” scores
226 were significantly different based on the time since graduation, p value 0.016 and 0.025
227 respectively.

228 Table 4 shows the scores of the four skill-related domains of the questionnaire, clinical,
229 practical, interpersonal, and coping. It can be seen from the table that male graduate nurses,
230 graduates nurses who were greater than 29 years of age, graduated in 2013, had experience as
231 a nurse for seven to 12 months, and had experience as an emergency nurse for one to six
232 months had the highest scores on the four skill-related domains. The table also shows that
233 graduates nurses from University A had the highest scores on three skill-related domains
234 except “practical skills”. The results show that participants’ “clinical skills” and “practical
235 skills” domains were significantly different based on gender with p value 0.006 and 0.001
236 respectively. The “practical skills” domain was also significantly different based on the time
237 from BN graduation ($p=0.010$) and the length of experience as a nurse ($p=0.043$). Experience
238 as a nurse was a significant difference for the “interpersonal skills” domain, $p=0.019$.

Table 4. Mean scores of skill-related domains based on demographic data

Characteristics		Clinical skills		Practical skills		Interpersonal skills		Coping skills	
		Mean (SD)	<i>p</i> value	Mean (SD)	<i>p</i> value	Mean (SD)	<i>p</i> value	Mean (SD)	<i>p</i> value
Gender	Male	71.31 (8.1)	0.006^a	29.76 (5.8)	0.001^a	51.28 (6.4)	0.467 ^a	33.08 (4.2)	0.198 ^a
	Female	68.95 (7.9)		26.20 (5.8)		50.82 (5.8)		32.73 (3.6)	
Age (years)	22-23	70.31 (6.8)	0.915 ^b	27.18 (5.9)	0.295 ^b	50.87 (5.1)	0.776 ^b	32.65 (3.4)	0.353 ^b
	24-25	69.24 (8.4)		27.60 (5.7)		50.69 (6.5)		32.89 (3.9)	
	26-27	70.70 (8.9)		29.24 (6.4)		51.97 (6.5)		32.95 (4.4)	
	28-29	69.71 (5.7)		24.71 (7.8)		52.29 (4.5)		33.29 (2.9)	
	>29	76.67 (7.1)		33.67 (4.5)		54.33 (4.7)		34.33 (2.1)	
Type of bachelor program	Program A	69.69 (7.9)	0.140 ^a	27.63 (5.9)	0.553 ^a	50.94 (6.1)	0.941 ^a	32.86 (3.8)	0.769 ^a
	Program B	71.00 (8.8)		27.08 (6.0)		51.28 (5.9)		32.83 (4.3)	
BN institutions	University A	71.26 (6.6)	0.111 ^b	26.79 (5.9)	0.111 ^b	51.18 (5.1)	0.794 ^b	33.13 (3.2)	0.813 ^b
	University B	69.04 (11.4)		26.48 (6.1)		51.08 (8.5)		32.56 (5.5)	
	Others	68.96 (8.3)		28.02 (5.9)		50.77 (6.2)		32.70 (4.0)	
Year of BN graduation	2013	73.20 (8.9)	0.097 ^b	31.20 (6.3)	0.010^b	53.50 (7.2)	0.449 ^b	34.20 (3.9)	0.254 ^b
	2014	69.07 (7.8)		27.27 (5.8)		50.66 (5.5)		33.02 (3.9)	
	2015	69.57 (8.2)		27.18 (6.0)		50.72 (6.2)		32.52 (3.7)	
Diploma of Nursing institutions ^c	Institution A	76.60 (6.6)	0.130 ^b	30.80 (7.0)	0.307 ^b	53.80 (6.6)	0.354 ^b	34.20 (1.6)	0.114 ^b
	Institution B	74.50 (4.9)		28.50 (3.5)		N/A ^c		N/A ^c	
	Institution C	67.33 (2.5)		25.67 (7.6)		49.67 (0.6)		32.33 (1.5)	
	Institution F	51.50 (28.9)		18.50 (9.1)		43.00 (14.1)		24.50 (10.6)	
	Others	71.76 (3.1)		26.88 (4.9)		51.47 (3.7)		34.06 (2.7)	
Length of nursing education (years)	4	69.40 (9.2)	0.656 ^b	32.20 (3.3)	0.052 ^b	46.00 (8.3)	0.321 ^b	32.80 (2.8)	0.675 ^b
	5	69.57 (8.3)		27.54 (6.1)		50.96 (6.1)		32.74 (3.9)	

	6	73.00 (6.7)		29.50 (6.2)		52.30 (7.4)		34.20 (3.6)	
	7	70.00 (1.4)		N/A ^c		47.50 (0.7)		34.50 (0.7)	
	9	72.30 (5.1)		26.45 (5.2)		51.80 (4.6)		33.80 (2.2)	
Experience as a nurse (months)	0	67.83 (7.8)	0.064 ^b	28.58 (5.7)	0.043^b	49.89 (6.5)	0.019^b	32.33 (3.7)	0.101 ^b
	1-6	69.13 (7.7)		26.62 (6.6)		50.11 (5.5)		32.77 (3.4)	
	7-12	73.82 (7.6)		31.00 (5.4)		53.73 (6.0)		34.18 (4.2)	
	>12	69.77 (13.4)		27.50 (6.6)		50.64 (8.5)		32.64 (6.4)	
Experience as ED nurse (months)	0	68.89 (7.3)	0.139 ^b	27.38 (5.7)	0.104 ^b	50.38 (6.1)	0.093 ^b	32.94 (3.5)	0.298 ^b
	1-6	72.91 (7.8)		29.00 (8.6)		53.64 (6.8)		34.00 (4.0)	
	7-12	71.50 (7.1)		28.93 (4.5)		50.64 (4.8)		32.64 (3.8)	
	>12	65.83 (6.5)		28.83 (7.5)		47.33 (10.9)		28.67 (8.1)	
Training experience (programs/courses)	0	67.72 (8.8)	0.388 ^b	26.55 (6.3)	0.228 ^b	50.36 (5.9)	0.903 ^b	32.45 (3.8)	0.982 ^b
	1	70.60 (7.3)		28.02 (5.8)		51.18 (5.9)		33.06 (3.6)	
	2	70.76 (7.5)		27.38 (5.8)		51.22 (6.1)		32.88 (3.7)	
	3	71.50 (7.0)		28.64 (6.3)		53.00 (5.6)		33.64 (3.5)	
	4	70.88 (7.3)		26.88 (7.2)		50.38 (8.4)		33.00 (6.6)	
	6	64.40 (17.7)		28.20 (5.0)		47.60 (11.4)		30.40 (9.7)	
	7	68.50 (10.6)		22.50 (0.7)		51.50 (6.4)		33.00 (4.2)	
	9	73.00 (8.4)		31.11 (5.2)		51.56 (6.1)		33.44 (2.9)	

^aTested using Mann-Whitney ^bTested using Kruskal Wallis ^cData were omitted during data analysis due to insufficient information includes

Institution D and E for diploma institutions

The differences in scores for the “communication with colleagues and other professionals” and “ethics and legal responsibilities” domains are presented in Table 5. Nurses who were greater than 29 years of age, graduated from Program B, graduated in 2013, and had one to six months experience as nurse had higher scores for “communication with colleagues and other professionals” and “ethics and legal responsibilities” domains. The remaining characteristics showed no significant difference.

Table 5. Mean scores of “communication with colleagues and other professionals” and “ethics and legal responsibilities” domains based on demographic data

Characteristics		Communication with colleagues and other professionals		Ethics and legal responsibilities	
		Mean (SD)	<i>P</i> value	Mean (SD)	<i>p</i> value
Gender	Male	37.20 (5.2)	0.244 ^a	19.55 (2.4)	0.110 ^a
	Female	36.76 (4.8)		19.85 (2.2)	
Age (years)	22-23	36.54 (4.4)	0.594 ^b	19.68 (1.8)	0.401 ^b
	24-25	36.97 (5.1)		19.66 (2.6)	
	26-27	37.30 (5.5)		19.73 (2.2)	
	28-29	37.29 (2.9)		20.00 (1.6)	
	>29	40.67 (2.5)		21.67 (2.3)	
Type of bachelor program	Program A	36.90 (4.9)	0.310 ^a	19.69 (2.3)	0.359 ^a
	Program B	37.40 (5.1)		20.05 (2.3)	
BN institutions	University A	36.88 (4.3)	0.711 ^b	20.01 (1.9)	0.250 ^b
	University B	37.28 (6.7)		19.56 (3.1)	
	Others	36.81 (5.1)		19.55 (2.4)	
Year of BN graduation	2013	39.15 (4.8)	0.120 ^b	20.00 (2.3)	0.571 ^b
	2014	36.78 (4.8)		19.63 (2.1)	
	2015	36.58 (5.1)		19.66 (2.4)	
Diploma of Nursing institutions ^c	Institution A	39.60 (2.3)	0.544 ^b	21.60 (1.8)	0.404 ^b
	Institution B	38.00 (2.8)		20.50 (0.7)	
	Institution C	36.00 (3.6)		20.67 (1.2)	
	Institution F	28.00 (16.9)		17.50 (3.5)	
	Others	38.35 (3.2)		19.94 (2.1)	
Length of nursing education (years)	4	36.00 (6.4)	0.900 ^b	18.40 (4.8)	0.340 ^b
	5	36.83 (5.1)		19.67 (2.3)	
	6	38.00 (4.8)		20.00 (2.1)	
	7	36.00 (4.2)		21.50 (0.7)	
	9	37.80 (3.0)		20.50 (1.8)	

Experience as a nurse (months)	0	36.25 (5.0)	0.181 ^b	18.94 (2.3)	0.108 ^b
	1-6	37.09 (4.1)		19.94 (1.6)	
	7-12	38.79 (4.9)		19.94 (2.3)	
	>12	36.86 (7.6)		19.82 (3.3)	
Experience as ED nurse (months)	0	37.03 (4.8)	0.102 ^b	19.32 (2.5)	0.073 ^b
	1-6	39.73 (4.2)		20.91 (2.2)	
	7-12	36.12 (4.3)		18.93 (1.8)	
	>12	32.33 (9.9)		18.83 (3.9)	
Training experience (programs/courses)	0	36.54 (5.4)	0.898 ^b	19.76 (2.1)	0.949 ^b
	1	37.24 (4.6)		19.69 (2.4)	
	2	37.03 (4.4)		19.81 (2.2)	
	3	37.43 (4.8)		20.21 (2.0)	
	4	36.25 (7.2)		19.50 (3.3)	
	6	32.60 (10.1)		18.20 (3.2)	
	7	34.00 (8.5)		19.00 (4.2)	
	9	37.89 (4.3)		19.67 (3.0)	

^aTested using Mann-Whitney ^bTested using Kruskal Wallis ^cData were omitted during data analysis due to insufficient information includes Institution D and E for diploma institutions

Discussion

The results of this study show that graduate nurses in this study believe they lack the practical skills and theoretical knowledge for being an ambulance nurse. Since prehospital care topics are not well-covered in the BN curriculum in Indonesia (Kolegium Ners Indonesia, 2015), nursing graduates in this study had limited skill to function as an ambulance nurse such as using ambulance communication systems. Mastering radio communication and telephone communication in prehospital setting enhances the ability to collaborate with other professionals such as police and fire brigade personnel in the prehospital setting was deemed to be the second highest of competencies needed by an ambulance nurse (Wihlborg, Edgren, Johansson, & Sivberg, 2014).

Furthermore, this lack of knowledge and skillset may not be recognized and has become an on-going issue with nursing education leaders as stated by Lock (2011). The quality of nursing education in Indonesia is variable due to the implementation of its curriculum and

lack of monitoring (Lock, 2011). The lack of prehospital care in the nursing curriculum was also reported in the United Kingdom (Melby, 2000b, 2001). Participants in this study also lacked the theoretical knowledge domains of the questionnaire. This result is similar to a previous study by O'Brien et al. (2013) where the paramedic student participants' lowest score was the theoretical knowledge domains (68.3%). That theoretical knowledge area includes the knowledge of anatomy, pathophysiology, microbiology, and physiology. Since those topics are usually provided in the early stage of education, both nursing and paramedic students had a common issue on recalling and applying that basic knowledge into practice. It might be the reason why the basic medical sciences were a large proportion of the specialist nursing programs in prehospital care in Sweden (Sjölin, Lindström, Hult, Ringsted, & Kurland, 2015).

The results of this study are similar to those of Melby's study (2001) which showed that nursing students in Ireland could not recognize the equipment needed inside the ambulance, as well as what an ambulance crew should do at the scene of emergency. Based on a study by Gentil, Ramos, and Whitaker (2008), there were several theoretical concepts that should be covered in prehospital education for nurses such as reading and interpreting electrocardiography (ECG), safety in the workplace, the use of personal protective equipment, and assessing the severity of patients. A study by Suserud and Haljamae (1999) revealed that all medical directors involved in the study were agreed that nurses working in the prehospital environment should have training in anesthetics or intensive care. The Swedish-based study shows that more than half (52%) of the course curriculum for specialist nursing in prehospital emergency care in the country was medical knowledge while nursing knowledge and contextual knowledge accounted for 22% and 26% respectively (Sjölin et al., 2015).

The nursing education institution has an important role in shaping the nursing graduates' competency in prehospital care. This is because clinical competencies can be achieved within a conducive clinical learning environment (Axelsson, Herrera, & Bang, 2016). Providing nursing students with clinical experience with ambulance services is essential to increase their competencies in prehospital care. Those experiences within the ambulance services might offer the students an insight into the work of an ambulance crew which may include medical-surgical, paediatrics, obstetrics, psychiatric and mental health patients in a prehospital setting with various culturally diverse patients (McEwen, 1999; Melby, 2000a). Therefore, Melby (2000a) suggested that nursing students should have some prehospital emergency care experience within their education as it can enhance the students' understanding of the ambulance service and its personnel. Nursing students at the University of Ulster, the United Kingdom, had a one week placement with ambulance personnel in their nursing course which started in 1996 (Melby, 2000b). There is no information available indicating whether it has been extended in the current nursing education.

Despite the different characteristics of the participants, another interesting result of this study is that the "ethics and legal responsibilities" domain was the highest score of current and O'Brien's studies, 82.1% and 86.7% respectively (O'Brien et al., 2013). Because participants of O'Brien's study were paramedic students, the scores of clinical and practical skill domains were outstanding (85%). On the other hand, the practical skill domain was the lowest score (65.5%) for nursing participants in this current study. In terms of prehospital practical skill, it is suggested that nurses should learn about the preparation and administration of medications in the prehospital setting (Gentil et al., 2008). However, even though Sweden has specialist nursing programs in prehospital care emergency care, its curriculum did not emphasize the clinical judgment and decision making in prehospital care which should be one of the main roles of ambulance nurses (Sjölin et al., 2015).

The results of this study also show that the time since graduation had significant influence on the participants' "theoretical knowledge", "lifelong learning", and "practical skills" scores. Participants who graduated earlier had the highest scores of those three domains compared to participants who graduated later. It is likely to be related to the length of experience as a nurse. Participants who graduated earlier might have a couple months of nursing experience which tend to make them more confident to be an ambulance nurse. Furthermore, this study also shows that working experience as a nurse also becomes a significant factor influencing the "practical skills" and "interpersonal skills" scores of the participants. It is suggested that the variation among nursing graduates in Indonesia might be caused by no standard confirmation in national level by which to measure the minimum standard of competencies among nursing graduates (Lock, 2011; Shields & Hartati, 2003). However, a new standard has been in place since 2013 where nursing and midwifery graduates with either diploma or bachelor degrees must undertake a national competency exam (Direktur Jenderal Pendidikan Tinggi, 2013).

Based on the results of the current study, it is suggested that improvement of prehospital education among Indonesian nurses is essential. Either informal or formal education by employer or the university sector should be encouraged to increase the competency of ambulance nurses in the country. Compared to the human resources of prehospital care in Sweden, where it has three levels within the ambulance workforce, the basic emergency medical technician (diploma degree), registered nurse (bachelor degree), and specialist ambulance nurse (registered nurse plus one year specialist training) (Abelsson & Lindwall, 2012). Pitt and Puspongoro (2005) suggested that paramedics in Indonesia should be nurses with additional training. Pitt and Puspongoro (2005) proposed three levels of paramedic, Level I, II and III where the Level I paramedic can be achieved with three year experience on the road and some classroom time while Level II and Level III paramedic can be attained by

one year both in the clinical setting and classroom for each level. However, the proposed plan is not recognized in the country and could not be implemented in the current environment. However, there is a paramedic school organized by Ambulans 118 in Banten Province. This is a three year program which trains year nine (junior high school) graduates to be a paramedic or caregiver who can work for ambulance services, fire brigades, red cross, mining companies, or a search and rescue team (Ambulans 118, 2016). Unfortunately, similar to other health-related vocational school graduates in Indonesia, there is no regulation regarding the roles and job description for those graduates in the clinical settings. In most cases, those graduates are not recognized within healthcare system in Indonesia.

Having no standard regulation for prehospital education also occurs in more developed nations, such as Europe (Nilsson & Lindstrom, 2015). Therefore, enhancing the capacity and competency of Indonesian nurses in prehospital care is important. Extending the scope of practice among nurses in prehospital care is more achievable than creating a new profession of prehospital care providers such as an EMT or paramedic. Since nurses have broad knowledge of medical care and procedures (Suserud & Haljamae, 1999) and learning the behavioral and humanistic sciences (Melby & Ryan, 2005), nurse-led ambulance service is the most applicable option for Indonesia.

This study is potentially limited as it accessed only BN graduates, the minimum requirement for registration as a nurse in Indonesia in the future. Since the majority of nurses currently employed in Indonesia are diploma qualified, investigating the work readiness to be an ambulance nurse among Diploma of Nursing graduates might extend the understanding of the prehospital workforce in Indonesia. The convenience sampling used in this study may affect the generalization of the findings.

Conclusion

This study revealed that nursing graduates in Indonesia need more specific prehospital content in their nursing education. Either informal or formal education provided by the employer or university sector is essential to enhance the nurses' competencies in prehospital care. A national regulation regarding human resources for prehospital care in Indonesia is required in order to control both in education and scope of practice.

Acknowledgments

None

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4.3 Knowledge, Attitudes, and Practice of Ambulance Nurses in Prehospital Care

Study Two investigated the perceived knowledge, attitudes, and practice of ambulance nurses about prehospital care. Similar to Study one, this was a cross-sectional study using a modified questionnaire from a previous study (Kumar et al., 2008). A pilot study was undertaken to measure the validity of the questionnaire (Appendix D). The study involved 465 participants from 22 hospitals and 34 *puskesmas* in Malang. A total of 185 questionnaires were distributed to possible participants at hospitals and *puskesmas*. While Study One investigated prehospital human resources from an educational perspective, Study Two explored it from a clinical practice perspective. The results were expected to create a more comprehensive understanding of prehospital human resources in Indonesia. The career pathways for nurses working in hospitals, in fact, are not covered in the national nursing regulation. This study thus sought to show the need for such regulations on minimum qualifications, and career pathways not only for nurses working in prehospital settings but for those working in the hospital settings as well. The detail of Study Two will be described in the following paper.

Manuscript Number: AENJ-D-17-00026

Title: Knowledge, Attitude, and Practice of Ambulance Nurses in
Prehospital Care in Malang, Indonesia

Article Type: Original Research papers

Keywords: knowledge; attitude; practice; ambulance; prehospital; nurses;
Indonesia.

Corresponding Author: Mr. Suryanto Suryanto, M.Nurs.

Corresponding Author's Institution: Monash University

First Author: Suryanto Suryanto, M.Nurs.

Order of Authors: Suryanto Suryanto, M.Nurs.; Virginia Plummer, RN, PhD;
Malcolm Boyle, PhD

Abstract: Background: Nurses are responsible for staffing ambulances in
Indonesia. However, those nurses may have limited knowledge and skills in
prehospital care because the Indonesian nursing curriculum focuses mostly
on in-hospital care. This study investigated the perceived knowledge,
attitude, and practice of ambulance nurses in prehospital care in Malang,
Indonesia.

Method: This was a cross-sectional study consisting of a paper-based
survey involving 465 participants from 45 health care services in Malang,
Indonesia.

Results: Participants' attitude score for prehospital care was the
highest and knowledge of prehospital care was the lowest score. This
study revealed that knowledge ($p=0.022$), attitude ($p=0.012$), and practice
scores ($p=0.026$) were significantly different based on the training
experience. The education level of participants contributed significantly
to the difference in attitude ($p=0.001$) and practice scores ($p=0.034$).
Participants' experience had a significant contribution to the difference
in attitude score ($p=0.002$). The knowledge ($p=0.001$) and practice
($p=0.002$) for prehospital care of hospital-based ambulance nurses were
significantly higher than puskesmas-based ambulance nurses.

Conclusions: This study revealed that Indonesian ambulance nurses lacked
prehospital care knowledge and skills. The findings from this study
provide information to establish a national regulation covering human
resources for prehospital care in Indonesia both for educational and
clinical levels.

Suggested Reviewers: Linda Shields PhD RN FRCNA
Professor of Nursing, Department of Nursing and Midwifery, University of
Limerick, Limerick, Ireland
linda.shields@ul.ie

Professor Linda Shields has publication(s) about nursing in Indonesia and its education.

Helena Sjölin RN, MSc
Department of Clinical Science and Education, Karolinska Institute,
Södersjukhuset, Stockholm, Sweden
[REDACTED]

Helena Sjölin has several publications about nurses working on ambulances in Sweden. Sweden is one of countries which employed nurses on the ambulances.

Anna Abelsson
Department of Nursing, Karlstad University, Karlstad, Sweden
[REDACTED]

Anna Abelsson has publication(s) about nurses working on ambulance in Sweden.

Opposed Reviewers:

Introduction

Indonesia is the fourth largest country by population in the world with more than 250 million people¹. With more than 13,000 islands², Indonesia comprises a 1,922,570 km² land area and 3,257,483 km² broad water area with Java, Sumatera, Kalimantan, Sulawesi and Papua the five largest islands in the country³. There are two major health services, hospitals and community health centres called *puskesmas*. The *puskesmas* are staffed with medical doctors, nurses and midwives and function at the district level⁴. The districts are a subdivision of the regency or city government. The main focus of the *puskesmas* is to provide community-based health services for prevention and cure, especially for family planning services, antenatal and postnatal care, immunisation, nutrition and sanitation consultations, and dental services⁵.

About one third of *puskesmas* (3,378 of 9,731) have inpatient facilities¹. Nurses working in a *puskesmas* are supplied with an ambulance and can provide emergency care to the community. However, some of the *puskesmas*-based ambulances only contain a stretcher and are used primarily for transporting staff.

On the other hand, there were 2,406 public hospitals in Indonesia at the end of 2014 consisting of 1,855 general hospitals and 551 specialty hospitals¹. There were also 807 private hospitals, 545 general hospitals and 262 specialty hospitals¹. Nurses working in hospital Emergency Departments (EDs) are also responsible for staffing the ambulance. This is similar to the experience of Sweden^{6,7}. Indonesian nurses are responsible for staffing ambulances because paramedics or Emergency Medical technicians (EMTs) are not yet recognised as part of the health workforce in Indonesia⁸. Compared to a *puskesmas*, in general, a hospital has more resources to provide prehospital care to the community. The hospital-based ambulance is better equipped compared to the *puskesmas*-based ambulance and some hospital-based ambulance nurses have received specialised training in prehospital

1 and emergency care. These two levels of healthcare provision are consistent across the
2 country. However, only a small number of people (11%) use the ambulance service with most
3 of the patients brought to the hospitals by public or private transport⁹.
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8 Indonesian nurses have formal education in emergency care during their Bachelor of Nursing
9 (BN) or Diploma of Nursing course relevant to the in-hospital setting; however, there is no
10 formal prehospital education for nurses who work on an ambulance. Nursing education in
11 Indonesia is divided into five levels, Diploma in Nursing, Bachelor in Nursing, Master in
12 Nursing, Nursing Specialist, and Doctor in Nursing¹⁰. The majority of nurses in Indonesia are
13 Diploma qualified, for example, in 2012 East Java province had 28,236 nurses with 26,056
14 (92.3%) Diploma in Nursing qualified or below¹¹. Nursing education in Indonesia focuses
15 mostly on in-hospital care including emergency nursing and only a few topics of prehospital
16 emergency care are covered during undergraduate nurse training¹². With limited knowledge
17 and skills of prehospital care, nurses working in the *puskesmas* and hospital EDs are
18 responsible for staffing the ambulances. This situation raises the question, “How competent
19 are nurses in providing care in the prehospital setting in Indonesia?”
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38 **Material and Methods**

39 ***Study Design***

40 This was a cross-sectional study consisting of a paper-based survey investigating the
41 perceived knowledge, attitude, and practice of ambulance nurses.
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51 ***Setting***

52 The study was undertaken in Malang, East Java Province, Indonesia. Three districts, using
53 codes District A, B, and C, were involved in the study. Those three districts are varied in
54 terms of area, population, and health facilities and were chosen because they represent the
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1 various levels of district from a rural area to an urban area. District A is the most developed
2 and urban area compared to the other two districts. District B is the most rural area while
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4 District C is between A and B from rural to urban. Moreover, the area development and
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6 health facilities of District C is in between District A and B. There are 59 *puskesmas* and 45
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8 hospitals in the three districts. Due to the time constrain, this study involved a total of 45
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10 health facilities, 22 hospitals and 34 *puskesmas* from those three districts.
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15 ***Participants/Population***

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18 Convenience sampling was used in this study. For analysis purposes, participants were
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20 divided into three groups based on geographic regions, groups A, B and C with two
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22 subgroups for each region, those working in a *puskesmas* and hospital ED. The data
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24 collection was performed from January to March 2015 and involved ambulance nurses from
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26 those three groups and subgroups. There is no published data available for the number of
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28 ambulance nurses in both ED hospitals and *puskesmas* specifically for those three districts.
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31 However, the 2013 annual report from East Java province stated that there were 3,627 nurses
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33 working in both hospitals and *puskesmas* in the three districts, with 2,836 in the hospitals and
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35 791 in the *puskesmas*¹¹. In 2014, the number of nurses in District A was the highest, 2,032
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37 nurses, compared to Districts B and C, 1,107 and 271 respectively¹³.
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44 ***Instrumentation***

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47 The questionnaire was adapted from a previous study in India by Kumar et al.¹⁴. The original
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49 questionnaire consisted of 30 items and three sub-scales with 10 questions each for
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51 knowledge, attitudes, and practices. The original questionnaire was tested by its original
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53 authors for face validity by review of two peers and was piloted with 10 participants.
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56 However, there is no information regarding the results of the validity and reliability testing of
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58 the original questionnaire.
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For this study, modifications were made to the questionnaire to suit Indonesian practice. Modifications included were in terms of the availability of medical instruments and prehospital practice which are not available in Indonesia such as a mucous extractor included as basic lifesaving equipment and the availability of EMS training and Centralised Accident and Trauma Services (CATS). Modification was also made by adding several training courses which are available in Indonesia but were not in the original questionnaire such as Trauma Nursing Care (TNC), General Emergency Life Support (GELS), Triage Officer, Electrocardiography and Resuscitation, and prehospital care of head, musculoskeletal, and spinal injuries. The questionnaire was translated into Bahasa Indonesia by the lead author. The modification resulted in a total of 41 Likert-Scale questions, 13 for knowledge, 20 for attitude, and 8 for practice. The questions related to the prehospital knowledge included the perceived understanding of patient management during transport and case management in the prehospital setting. The questions related to attitude covered participants' opinions about continuing education in prehospital care for both healthcare providers. The prehospital practice-related questions sought participants' opinions about their prehospital practice such as performing cardio pulmonary resuscitation. The questions were on a Likert-Scale of one to four, ranging from "very poor" to "very good" for the "knowledge" sections and the scale ranged from "strongly disagree" to "strongly agree" for the "attitude" and "practice" sections. The translated modified questionnaire was tested during a pilot study which involved 14 ambulance nurses both from hospitals and *puskemas*. An internal consistency test was undertaken using Cronbach's Alpha which demonstrated a scale reliability score of 0.932, meaning the questionnaire has high internal consistency.

Procedures

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3 All ambulance nurses in 45 health care services, 22 hospitals and 34 *puskesmas*, were invited
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5 to participate in the study. Nurses were included in the study if they worked in the *puskesmas*
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7 or hospital ED and were roastered for staffing the ambulance at their institutions. One hundred
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9 and eighty-five questionnaires were distributed to the hospital-based ambulance nurses and
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12 372 questionnaires to the *puskesmas*-based ambulance nurses.
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16 An information session about the study was provided by one of the authors in each healthcare
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18 institution. All potential participants were provided with the explanatory statement and
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20 questionnaire. There was a sealed box provided for participants to return the completed
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22 questionnaires. All returned completed anonymous questionnaires were coded and processed
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24 for analysis.
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Ethics

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31 Ethical approval was granted by two ethics committees, the Monash University Human
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33 Research Ethics Committee (MUHREC), in Australia, project number CF14/543 –
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35 2014000199 and the Health Research Ethics Committee of the Ministry of Health of
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37 Indonesia, project number LB.02.01/5.2/KE.451/2014.
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Data Analysis

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45 Data analysis was undertaken using SPSS (Statistical Package for the Social Sciences
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47 Version 22, IBM Corporation, Armonk, New York, U.S.A.). Descriptive statistics were used
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49 to summarise the demographic data of the participants. Descriptive statistics, proportions,
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51 mean and standard deviation (SD), were also used to summarise the Likert Scale responses
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53 where the responses were converted to numbers, “one to four” for “very poor to very good”
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1 and for “strongly disagree to strongly agree”. The answers were then totalled and resulted in
2 the range of 13-52 for knowledge, 20-80 for attitude, and eight to 32 for practice.
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5 Inferential statistics were used to compare the differences and the relationships between the
6 knowledge, attitudes and practice of prehospital care of the participants among the three areas
7 and the two healthcare institutions. The data was initially tested for normality using the
8 Kolmogorov Smirnov test and all data were identified as not normally distributed. Therefore,
9 non-parametric data analysis was used for further examination. Results were considered
10 statically significant, if the p value was <0.05 and confidence intervals (CI) are 95%.
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21 **Results**

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25 There were participants from 14 hospitals and 31 *puskesmas*. The response rates were 170
26 hospital staff (91.9% response rate) and 312 *puskesmas* staff (83.9% response rate) who
27 participated in the study. From the 482 questionnaires returned, 17 were excluded due to an
28 incomplete questionnaire leaving 465 questionnaires for further analysis. *Puskesmas*-based
29 ambulance nurses accounted for a higher number compared to hospital-based ambulance
30 nurses, 304 and 161 respectively. The details of participants involved in the study can be seen
31 in Table 1.
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Table 1. The number of participants of the study

Health Centres	Area	Centres Involved	Number of Participants
			n (%)
<i>Puskesmas</i>	District A	13	85 (18.3)
	District B	13	172 (37)
	District C	5	47 (10.1)
Hospitals	District A	4	58 (12.5)
	District B	7	80 (17.5)
	District C	3	23 (4.9)
Total		45	465 (100)

Demographic Characteristics

Table 2 reports the difference in frequencies among participants for gender, age, highest level of education, working experience and training experience. More than half of the participants, 275 (59.1%), were female and a majority, 183 (39.4%), were 26-30 years of age. More than three quarters of the participants, 356 (76.6%), were Diploma in Nursing qualified. On average, the participants had 10 years' experience as a nurse and seven years' experience as an ambulance nurse. The ambulance nurses had attended at least one emergency-related training course.

Table 2. Participants' demographic

	Characteristics	n (%)	Mean (SD)
Gender	Male	150 (32.3)	N/A
	Female	275 (59.1)	
	Not mentioned	40 (8.6)	
Age (years)	<25	58 (12.5)	32.67 (8.4)
	26-30	183 (39.4)	
	31-35	80 (17.2)	
	36-40	55 (11.8)	
	41-45	23 (4.9)	
	46-50	34 (7.3)	
	>50	22 (4.7)	
	Not mentioned	10 (2.2)	
Highest level of education	Vocational School of Nursing	36 (7.7)	N/A
	Diploma in Nursing (DIII)	356 (76.6)	
	Diploma IV in Nursing	10 (2.2)	
	Bachelor of Science in Nursing	55 (11.8)	
	Not mentioned	8 (1.7)	
Length of experience as a qualified nurse (years)	<5	174 (37.4)	10.19 (8.0)
	6-10	107 (23)	
	11-15	67 (14.4)	
	16-20	39 (8.4)	

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	21-25	30 (6.5)	
	26-30	23 (4.9)	
	>31	6 (1.3)	
	Not mentioned	19 (4.1)	
Length of	<5	126 (27.1)	7.4 (7.1)
experience as an	6-10	56 (12)	
ambulance nurse	11-15	18 (3.9)	
(years)	16-20	8 (1.7)	
	21-25	8 (1.7)	
	26-30	9 (1.9)	
	>31	1 (0.2)	
	Not mentioned	239 (51.4)	
Training	0	22 (4.7)	2.6 (1.8)
experience	1	149 (32)	
(programs/courses)	2	119 (25.6)	
	3	69 (14.8)	
	4	48 (10.3)	
	5	20 (4.3)	
	6	21 (4.5)	
	≥7	17 (3.6)	

Knowledge, Attitude, and Practice of Prehospital Care

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5 Table 3 shows the participants' knowledge, attitude, and practice score. It can be seen from
6
7 the table that participants' attitude score was the highest ($67.6/80 = 84.5\%$) and knowledge
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9 score was the lowest ($36.5/52 = 70.1\%$) compared to the other two scores. It can also be seen
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11 from the table that knowledge ($p=0.022$), attitude ($p=0.012$), and practice scores ($p=0.026$)
12
13 were significantly different based on the training experience. Participants' knowledge and
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15 practice scores were significantly different based on gender, $p=0.043$ and $p=0.001$
16
17 respectively. The education level of participants contributed significantly to the difference in
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19 attitude ($p=0.001$) and practice scores ($p=0.034$) of the participants. Participants' experience
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21 as an ambulance nurse also had a significant contribution to the difference of the attitude
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23 score ($p=0.002$).
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Table 3. Knowledge, attitude, and practice score based on demographic data

Demographic Data		Knowledge		Attitude		Practice	
		Mean (SD)	<i>p</i> value	Mean (SD)	<i>p</i> value	Mean (SD)	<i>p</i> value
Gender	Male	37.69 (5.8)	0.043¹	67.98 (9.9)	0.316 ¹	25.07 (2.8)	0.001¹
	Female	36.03 (4.8)		67.49 (8.3)		23.02 (3.4)	
Age (years)	<25	37.37 (6.2)	0.153 ²	63.33 (13.9)	0.427 ²	23.52 (4.2)	0.873 ²
	26-30	36.10 (5.9)		67.22 (8.9)		23.91 (2.8)	
	31-35	36.95 (4.7)		69.37 (7.5)		23.93 (3.3)	
	36-40	37.85 (5.4)		69.79 (6.8)		23.91 (3.8)	
	41-45	35.50 (3.9)		72.13 (4.5)		24.75 (3.5)	
	46-50	35.71 (3.7)		66.88 (7.1)		24.12 (4.4)	
	>50	37.27 (2.5)		66.73 (6.5)		25.00 (3.1)	
Highest Education	Vocational School of Nursing	36.75 (1.9)	0.777 ²	63.75 (5.9)	0.001²	23.44 (2.7)	0.034²
	Diploma in Nursing (DIII)	36.76 (5.6)		67.48 (9.6)		23.89 (3.4)	
	Diploma IV in Nursing	39.00 (13.0)		71.00 (9.8)		26.00 (5.0)	

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	Bachelor of Science in	36.63 (4.1)		70.93 (6.8)		24.30 (3.1)	
	Nursing						
Experience as a	<5	36.76 (5.9)	0.070 ²	65.69 (10.3)	0.333 ²	23.84 (3.1)	0.063 ²
nurse (years)	6-10	36.22 (5.9)		67.52 (9.3)		23.70 (3.4)	
	11-15	37.26 (4.5)		69.86 (6.7)		23.94 (4.0)	
	16-20	37.95 (4.5)		71.90 (6.8)		24.35 (3.6)	
	21-25	36.53 (3.4)		69.12 (6.5)		26.12 (2.9)	
	26-30	35.25 (2.9)		65.92 (6.9)		22.92 (3.5)	
	>31	37.50 (2.1)		60.50 (0.7)		23.50 (0.7)	
Experience as an	<5	36.26 (5.6)	0.529 ²	65.98 (9.9)	0.002²	24.17 (2.9)	0.090 ²
ambulance nurse	6-10	37.67 (5.3)		70.09 (7.1)		23.04 (4.0)	
(years)	11-15	38.24 (4.1)		72.59 (4.7)		25.47 (3.4)	
	16-20	34.86 (3.4)		68.57 (5.6)		24.43 (4.9)	
	21-25	36.75 (3.6)		69.63 (6.9)		25.00 (3.5)	
	26-30	35.67 (1.5)		64.78 (7.6)		23.22 (3.7)	

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Training	1	36.15 (5.5)	0.022²	65.98 (10.9)	0.012²	23.39 (3.9)	0.026²
experience	2	36.32 (6.1)		68.58 (7.1)		23.64 (2.9)	
(programs/courses)	3	36.69 (4.6)		68.41 (6.6)		24.45 (2.5)	
	4	37.52 (3.4)		69.96 (6.6)		24.84 (2.4)	
	5	37.64 (5.9)		64.09 (15.8)		25.27 (2.8)	
	6	36.90 (5.4)		70.50 (5.6)		22.90 (4.9)	
	7	38.25 (2.2)		67.00 (11.2)		24.25 (1.9)	
	9	43.00 (1.4)		75.50 (6.4)		26.00 (1.4)	
Total participants		36.46 (70.1%)		67.58 (84.5%)		24.14 (75.4%)	

¹Mann-Whitney test, ²Kruskall-Wallis test

Table 4 shows the differences in scores among participants based on the three districts. It can be seen from the table that ambulance nurses in District C had the lowest mean scores for knowledge, attitude, and practice for prehospital care compared to the other two areas. On the other hand, ambulance nurses in District A had the highest mean score for the three elements of the questionnaire. However, Table 4 also shows that there is no significant difference in the scores between District A, B, or C ambulance nurses.

Table 4. Knowledge, attitude, and practice score in three different areas

Scores	Area	Min Score	Max Score	Mean (SD)	<i>p</i> value
Knowledge	District A	25	49	36.8 (4.4)	0.264 ¹
	District B	15	52	36.6 (5.6)	
	District C	25	52	35.5 (5.4)	
Attitude	District A	21	80	67.9 (8.8)	0.168 ¹
	District B	20	80	67.8 (8.3)	
	District C	57	80	66.1 (6.6)	
Practice	District A	16	32	24.6 (2.9)	0.079 ¹
	District B	8	32	24.1 (3.3)	
	District C	8	32	23.3 (3.8)	

¹Kruskall Wallis test

The difference in scores between hospital-based and *puskesmas*-based ambulance nurses can be seen in Table 5. It can be seen that the hospital-based ambulance nurses had a higher mean score for knowledge and practice of prehospital care compared to

puskesmas-based ambulance nurses. The mean attitude score was almost similar between the two groups of participants. Table 5 also shows that participants' knowledge ($p=0.001$) and practice ($p=0.002$) for prehospital care were significantly different between puskesmas-based and hospital-based ambulance nurses.

Table 5. The difference of knowledge, attitude, and practice score between puskesmas-based and hospital-based ambulance nurses

Scores	Area	Min Score	Max Score	Mean (SD)	<i>p</i> value
Knowledge	<i>Puskesmas</i>	15	52	35.4 (5.2)	0.001¹
	Hospitals	17	50	38.4 (4.8)	
Attitude	<i>Puskesmas</i>	52	80	67.6 (7.1)	0.394 ¹
	Hospitals	20	80	67.6 (10.1)	
Practice	<i>Puskesmas</i>	8	32	23.8 (3.3)	0.002¹
	Hospitals	8	32	27.7 (3.3)	

¹Mann-Whitney test

Discussion

The results of this study demonstrate that participants' attitude score was the highest compared to participants' knowledge and practice scores. A similar study in India by Kumar et al.¹⁴ showed that participants' practice score for prehospital and emergency care was the highest followed by attitude and knowledge scores. The participants in Kumar et al.'s study were medical practitioners including resident doctors, hospital consultants and private medical practitioners¹⁴. They were not prehospital care providers and their practice of prehospital care and emergency care was not surprisingly

1 higher compared to participants in this study. Kumar' et al.'s study investigated the
2
3 knowledge, attitude, and practice of prehospital care and emergency services among
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5 medical staff in the absence of an EMS system and dedicated paramedic staff in India.
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10 The results of this study show that training experience had a significant influence on the
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12 knowledge, attitude, and practice scores for prehospital care. The emergency-related
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14 training courses undertaken by some participants in this study including basic/advanced
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16 cardiac/trauma life support courses, ambulance protocol course, and trauma nursing care
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18 courses are likely to enhance their competence in prehospital care, noting a lack of
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20 prehospital care content in the Indonesian BN curriculum. In Malta, nurses from
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22 hospital ED are also working on an ambulance, and they receive continuous in-hospital
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24 training covering aspects of emergency and prehospital care¹⁵. However, it is suggested
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26 that Malta needs specially trained ambulance paramedics in order to reduce the need for
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28 nurses working on an ambulance as this in turn reduces the number of experienced
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30 nurses working in the hospital ED¹⁵.
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38 Prehospital care education for nurses in Sweden started in 1997 and was developed into
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40 a specialist program in prehospital emergency care in 2001⁷. From 2005, a registered
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42 nurse (RN) must be part of the ambulance crew together with one Emergency Medical
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44 Technician (EMT)⁶. However, a recent study by Sjolin et.al⁷ found that the specialist
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46 program in prehospital emergency care for nurses in Sweden had an imbalanced
47
48 proportion between medical knowledge, nursing knowledge, and contextual knowledge.
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50 More than half (52%) of the topics covered in the program were related to medical
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52 knowledge and only 22% of the topics were associated with nursing knowledge⁷.
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57 Although Sweden is considered to be advanced in providing prehospital care education
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1 for nurses, there is no regulation for education and continuing professional development
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3 for nurses working in an ambulance service in that country¹⁶. In Indonesia, with no
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5 formal course of education for qualified nurses working on an ambulance, the nurses'
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7 actual knowledge of prehospital care remains unknown.
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12 Participants from the *puskesmas* had significantly lower scores for perceived knowledge
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14 and practice about prehospital care compared to hospital-based ambulance nurses. This
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16 is likely to be due to the fact that the *puskesmas* provide primary healthcare services and
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18 therefore do not usually manage complex cases⁵. Ambulance nurses who work in
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20 hospitals tend to have a higher level of prehospital care knowledge and more diverse
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22 practical skills due to greater exposure to a higher numbers of patients who are more
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24 acutely unwell.
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30 This study highlighted the need for education about prehospital care for nurses in
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32 Indonesia. As a majority of ambulance nurses in Indonesia were Diploma in Nursing
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34 graduates, supplementary content on prehospital care should also be introduced into the
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36 Diploma as well as Bachelor of Nursing curricula. For post graduates, a short course in
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38 prehospital care is essential with Level 1 and 2 modules for *puskesmas* and hospital staff
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40 reflecting the complexity of prehospital care skills and knowledge required.
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46 A potential limitation of this study was that more than half of the participants did not
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48 report their length of experience as an ambulance nurse. It might be caused by the fact
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50 that in a majority of institutions there is no regulation which describes the different roles
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52 between ED nurses or ambulance nurses in both the *puskesmas* and hospital ED. Most
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54 nurses in the *puskesmas* and hospital EDs are also responsible for ambulance services,
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56 thus, their roles as ED nurse and as ambulance nurse overlap. Furthermore, the
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1 questionnaire for this study measured perceived knowledge, attitude, and practice about
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3 prehospital care, therefore, the competence of Indonesian nurses in providing
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5 prehospital care could not be measured in this study.
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9 10 **Conclusion**

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13 This study revealed that overall, attitude to prehospital care scored highly, however
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15 knowledge and skills about prehospital care among ambulance nurses requires support,
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17 especially for *puskesmas*-based ambulance nurses. This indicates that ambulance nurses
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19 in Indonesia have the right approach to the role but require educational support. A
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21 program of education including a short course in prehospital care for postgraduate
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23 ambulance nurses and introductory content in undergraduate curricula, both guided by a
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25 framework of agreed competencies, is recommended. The findings from this study have
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27 provided evidence which would inform development of relevant courses and
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29 competencies for other nurses working in similar settings.
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37 **Acknowledgements**

38 We wish to thank the nurses that took the time to complete the questionnaire.
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43 **Funding sources**

44 This research did not receive any specific grant from funding agencies in the public,
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46 commercial, or not-for-profit sectors.
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4.4 Chapter Summary

These studies showed that nursing graduates perceive they have insufficient prehospital-related practical skills and theoretical knowledge to staff ambulances because prehospital content was limited in the nursing curriculum in Indonesia. The results of Study One were in accordance with those of Study Two, where ambulance nurses lacked sufficient knowledge and correct practice in prehospital care, showing a parallel situation; when the nursing curriculum had limited prehospital content, nursing graduate competency in prehospital care was limited, and the knowledge and practice in prehospital care among ambulance nurses were sub-optimal. Thus, adding prehospital care content to the curriculum is essential to enhance the competencies of nursing graduates.

Formal or informal education for ambulance nurses in prehospital care is likewise important as it may improve prehospital care outcomes. Informal education could include in-house short course to cover prehospital-related skills such as using ambulance radio communication. The short course in prehospital care might enhance the nurses' confidence in working on ambulance; this is because Indonesian nurses already have the basic knowledge and skills in providing care, but not specifically in the prehospital setting.

Prehospital care education is more necessary for *puskesmas*-based ambulance nurses than hospital-based ambulance nurses. In areas where the 119 EMS system is not implemented, such as in Malang, the community can choose the service they want and tend to utilise hospital-based ambulance services due to better equipped ambulances. Therefore, hospital-based ambulance nurses tend to have more experience managing prehospital patients than *puskesmas*-based ambulance nurses. Study Three investigated the possible reasons and solutions for the unorganised EMS system in Malang and five other cities in Indonesia, which are discussed in the following chapter.

Chapter 5 Prehospital Care System in Indonesia

5.1 Introduction

This chapter describes the second main focus of this research: the prehospital system in Indonesia. This system represents a breakthrough for prehospital care in Indonesia more than a decade after the previous 118 EAS system ended. Study Three explored the barriers and solutions to implementing an EMS system in Indonesia. The study was undertaken in six large cities that had implemented the previous 118 EAS system. The results provide an overview of the obstacles faced by local ambulance providers in implementing the new EMS system. The study also explored possible solutions to implementing the system. This study could be useful when developing the system, especially for local government and local hospitals that have not yet implemented the current 119 EMS system.

5.2 Barriers and Solutions in Implementing an EMS System in Indonesia

Semi-structured interviews were used for Study Three of this research and involved seven participants from six cities: Jakarta, Palembang, Surabaya, Makassar, Malang, and Denpasar. The questions asked during the interviews were based on a previous study by Levine, Presser, Rosborough, Ghebreyesus, and Davis (2007), which focused on care in the community, care during transportation, and care on arrival at the receiving health facility (Appendix E). Thematic analysis was the analytic method used by two independent researchers to analyse and interpret the themes in the responses (Braun & Clark, 2006). This study focused more on hospital-based ambulance services because the previous 118 EAS system was managed by local hospitals, not *puskesmas*.

PREHOSPITAL and
DISASTER MEDICINE



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**Barriers and solutions to implementing an EMS system in
Indonesia from a decision makers' perspective: A
qualitative study**

Journal:	<i>Prehospital and Disaster Medicine</i>
Manuscript ID	PDM-17-0152
Manuscript Type:	Original Research
Keywords:	EMS system, Indonesia, prehospital, problems, solutions

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Manuscripts

Barriers and solutions to implementing an EMS system in Indonesia from a decision makers' perspective: A qualitative study

Abstract

Introduction

Prehospital care in Indonesia is still under-developed. The breakthrough with the launch of the 119 Emergency Medical Services (EMS) occurred some ten years after the previous 118 EMS system. During those ten years, the prehospital care in Indonesia had been unorganised. This study has investigated the barriers and solutions for implementing an EMS system in Indonesia.

Methods

This was a qualitative study utilising semi structured interview involving seven participants from six cities in Indonesia. Thematic analysis was used to analyse the data.

Results

Six themes relating to the barriers to implementing an EMS system in Indonesia were identified. It includes lack of government support, issues with human resources, problems at hospital level, barriers with community awareness, insufficient ambulance vehicles and road traffic. Five themes emerged from the data for providing solutions to the implementation of an EMS system in Indonesia. It comprises implementation of the EMS system, creativity at the local health facility level, enhancing prehospital providers' capacity, government support, and community empowering.

Conclusion

This study suggested that the initial implementation of the EMS system is a necessity. There is an expectation that the 119 EMS system can be implemented in all areas of Indonesia so that prehospital care can be provided to all people within Indonesia.

Keywords: EMS system; Indonesia; prehospital; problems; solutions.

For Peer Review

Introduction

Prehospital care in Indonesia is still under-developed. It is not surprising because most of the Lower-Middle Income Countries (LMICs), like Indonesia, lack an organised Emergency Medical Service (EMS) system with ambulances commonly used for non-patient care related transport only [1]. However, Indonesia implemented an EMS system called the 118 Emergency Ambulance Services (EAS) which was established in around the year 2000 and was implemented in 18 Indonesian cities [2] including Jakarta, Palembang, Yogyakarta, Surabaya, Makassar, Denpasar, and Malang [3]. However, the system was ceased due to lack of funding support from the national government [3]. The duration of the 118 EAS system varied in the cities where it was implemented. In Malang, East Java, the system lasted about five years.

The current EMS system in Indonesia, called the 119 Emergency Medical Service, was launched in July 2016 by the Ministry of Health of Indonesia [4]. The system currently implemented in 27 locations in Indonesia coinciding with the establishment of the National Command Centre (NCC) in Jakarta and Public Safety Centres (PSCs) in the 27 locations [4]. The locations were chosen in the pilot project because they have national government hospitals in the regency or city level [5]. However, during the pilot project of the latest EMS system, the location of the PSCs is not well-distributed (Table 1).

The 27 locations are in 14 out of 34 provinces. Based on the annual report of the Ministry of Health of Indonesia, there were 514 regencies/cities within 34 provinces in Indonesia in 2015 [6]. Therefore, the implementation of the 119 EMS in the 27 locations in 14 provinces in Indonesia is limited. The majority of Indonesia still has an unorganised EMS system where ambulance services are either hospital-based or *puskemas*-based. The *puskemas* or community health centre is the second type of two major health facilities in Indonesia, after

the hospitals. The *puskesmas* is located at the sub-district level, the subdivision of regencies or cities. The *puskesmas* provides community-based health services for prevention and cure of diseases [7] with about 35% of the *puskesmas* having in-patient facilities [6].

In general, ambulance services in Indonesia are part of the hospital emergency department (ED) services or *puskesmas*. The hospital-based ambulance, generally, has more equipment and facilities compared to a *puskesmas*-based ambulance with some of the *puskesmas*-based ambulances only having a stretcher. However, due to the absence of a call centre for emergency situations, the community tend to go to the ED of a hospital by themselves, either using private vehicles or public transport. A survey investigated the utilisation rate of the ambulance for emergency situations was undertaken in Malang and found that only 11% of patients were transported to the hospital ED by ambulance [8].

The breakthrough with the launch of the 119 EMS occurred some ten years after the previous 118 EAS system. During those ten years, the prehospital care in Indonesia had been unorganised. The published data only shows that the cessation of the previous 118 EAS was caused by lack of financial support, however, there is no further detailed explanation regarding this issue. This study has investigated the barriers and solutions for implementing an EMS system in Indonesia.

Methodology

Study Design

This was a qualitative study utilising semi-structured interviews to investigate the issues and explore possible solutions to implementing an EMS system Indonesia.

Setting

The study was undertaken in five Indonesian cities, Palembang, Surabaya, Makassar, Malang

and Denpasar from January to March 2015. These cities were identified for the study as cities which had participated in the 118 EAS project [3] Due to administrative reasons, hospitals in Jakarta and Jogjakarta were unable to participate in the study. This study involved seven organisations in those five cities, five hospitals, an ambulance provider organisation, and the Indonesian Emergency and Disaster Nurses Association.

Participants

Convenience sampling was used in this study. Seven participants involved in this study. Five of the participants were the representative of the EDs of six major hospitals, one private ambulance service and one emergency nursing association.

Instrumentation

A semi-structured interview was used in this study. The questions for the interviews were based on a previous study by Levine et al. [9] which focused on care in the community, care during transportation, and care on arrival at the receiving health facility (Table 2).

Procedures

Initially, nine organisations from seven cities were contacted via publicly accessible phone contact details. Each organisation was contacted by phone and was invited to participate in the study. The detailed information about the study was described via phone. Participants who are agreed to participate in the study, seven participants, were initially asked for consent via phone and during the agreed time for interview, the participants signed the consent form. The interview was conducted by the researcher using the list of questions and the interviews were recorded using a mobile device. The interview was conducted in Bahasa Indonesia.

Ethics

Ethical approval was granted by two ethics committees, the Monash University Human Research Ethics Committee (MUHREC), in Australia, project number CF14/543 – 2014000199 and the Health Research Ethics Committee of the Ministry of Health of Indonesia, project number LB.02.01/5.2/KE.451/2014.

Data Analysis

Thematic analysis was used in this study. The seven interviews, which were lasting between 41 and 91 minutes (mean: 64 minutes), were transcribed verbatim and then analysed manually using a word document in order to find the themes and sub-themes for the barriers and solutions to implementing an EMS system. The analysis was undertaken using original transcript in Bahasa Indonesia and was undertaken by one of the authors who is an Indonesian native. The analysis started with the data organisation into meaningful groups within two major groups, problems and solutions. Thematic analysis phases was undertaken according to Braun and Clarke [10] which were re-reading the data and put initial ideas. Then, initial codes were generating and collating the codes to search the themes. After the themes were identified, those themes were reviewed, defined and named. The analysis was undertaken for each group and connections between initial themes were identified along with related sub-themes. At the end of the analysis, six themes were identified as barriers in implementing an EMS system in Indonesia and five themes were identified as possible solutions to overcome the barriers. The results were then translated into English and were checked by the other researchers who are Australian native. The participants' identity was removed and a code (P1 to P7) was used to protect the anonymity of the individuals and organisations.

Results

Barriers in implementing an EMS system in Indonesia

The analysis identified six themes relating to the barriers to implementing an EMS system in Indonesia. It includes lack of government support, issues with human resources, problems at hospital level, barriers with community awareness, insufficient ambulance vehicles and road traffic (Table 3).

Lack of government support

The analysis highlighted that government has an important role in the establishment of a well-organised EMS system. Four sub-themes emerged including the government's lack of awareness for the importance of establishing an EMS system, insufficient national guidelines covering prehospital care, lack of budget support, and related political issues.

Lack of government awareness

It was identified that prehospital care is not government priority. Both national and local government regulations may influence the establishment of an EMS system in Indonesia. The two levels of the government do not appear to be convinced that there is a need for an EMS system, coincidentally professional organisations, such as the Indonesian Medical Board and Indonesian Nurses Association, need to inform the government of the importance of an EMS system.

“Because one thing, the ministry do not really guard. Not really support. Meaning that the ambulance services have been handed-over to the local government. The ministry has about 34 vertical hospitals. But the support is only for the facilities. But the human resources, the trainings, has been handed-over to the local government. So because of the financial limitation and others, the government only provides bottom-up services from each local government to run the system. With this system, it has been declared

that we used integrated EMS or Sistem Penanggulangan Gawat Darurat Terpadu (SPGDT – The Comprehensive System of Emergency Care) and it has been offered to the local government to develop, a project. In the local government level, exactly the same, the local government also don't care. Some of them do care, but misconducted"

(P3)

In Indonesia, health services can be managed by both national government, provincial government and district government. The Health Department of each district has an important role in the establishment of an EMS system. Within the decentralisation system, local government has an authority to manage their area. Both the Ministry of Health and Health Department in each district must have the same vision for improving the current prehospital care system.

"I think, the problem is in the Health Department that should become the initiator, they have no, have no concern and commitment. We are in X hospital have been tried couple times to have an initiation, but then I thought, well, it should not be like this. Cannot be. We, first of all, it's not our main job, secondly, there is financial consequences on it. So, we comeback, raw" (P6)

Lack of national guidelines on prehospital care

Given prehospital care is not seen as a government's priority, the regulation covering prehospital care is limited. The Health Ministry of Indonesia Regulation will need to create guidelines for an EMS system which then the hospitals can apply to a system. The hospitals are the organisations providing the current service but a national guideline is required for them to be part of a national integrated system. The implementation of the current universal health insurance called *Badan Penyelenggara Jaminan Sosial (BPJS)* also influences the

prehospital care service and the regulation of ambulance services for BPJS users must be re-evaluated.

“There are so many examples, like in Jakarta, where, there are so many private ambulances, but profit-based ones, but it’s not clear. How the regulation of it, the legal aspect of it is not clear and others. Then, who will protect them? What about the risk? Not clear” (P3)

Insufficient budget support

Financial issues are one of the obstacles to implementing an EMS system in Indonesia. As prehospital care is not a government priority, there is no budget allocated for even the current ad hoc system. The national government requested the local governments, and even the hospitals, to create an EMS system with the funding within their budgets. However, similar to the national government, there was no funding allocated for prehospital care at the local level. To reduce the budget, outsourcing and contracted staff have been employed for ambulance services in several places. The implementation of the BPJS and decentralisation of the health management system created no better situation due to a limited budget for both services and human resources for prehospital care.

“If we have a discussion, about emergency care, emergency care is expensive. If we calculate the cost, from all of the system, emergency care is the most expensive one. Because in emergency services, every service must be available, all lifesaving equipment must be there, the human resources must be available. But the emergency cases is not always there, right? But if we do not provide that but then suddenly there are lots emergency cases. So the contingency must be robust for the readiness. So, I am sorry, but the budget is the problem. If there a budget, there is a program, right?” (P1)

Political issues

The changing leadership in both governments and hospitals has contributed to the lack of an EMS system in Indonesia. Not all government and hospital leaders have the same opinion about the importance of prehospital care, this is often influenced by their political party agenda. Donations from other countries has also been met with barriers, for example, when Singapore tried to donate 38 ambulances, Indonesian Border Control had certain regulations that prevented it, so the ambulances were given to another country.

“For the X province, we have had a meeting with, erm, meet with all hospital directors in X province, under the Health Department, to be committed for the establishment of the 119 call centre. We had signed the MoU, but that was, erm, in concurrent with the Governor election, we waited for the result of the election. But unfortunately, after the election, there is no progress by the elected Governor until now after that commitment, but we have the structure already” (P6)

Human resources problems

The available human resources will influence the development of an EMS system in Indonesia. Currently there is no dedicated paramedics or Emergency Medical Technicians (EMT) for staffing an ambulance, staffing for the current ambulance service is provided by nurses. Four sub-themes emerged about human resources barriers contributing to the under-developed EMS system in Indonesia, lack of regulation, inadequate numbers, competency issues, and problem related with non-health workers.

No regulation for prehospital care human resources

There is no national regulation for an EMS or any form of prehospital care system in Indonesia, including the regulation for human resources working on the ambulance and/or in the hospital ED. There are no standard requirements for nurses working on the ambulance and/or in the hospital ED, including no minimum standard of education or emergency

training for nurses working on the ambulances. Moreover, there is lack of regulation covering nurses' and their authority to undertake emergency interventions.

“Who is an ambulance nurse? Who is emergency nurse? Is that a general nurse working in emergency department? What are their competencies? If they are general nurses working in emergency department, they should have a general competency, right? We don't have an emergency nurse. But we cannot be like that. What's happening then is general nurses working at emergency department has been forced to be an emergency nurse competency. Because we still don't have any specialist” (P1)

Limited amount of ambulance staff

In Indonesia, the majority of hospitals do not have specific nurses working on the ambulance. Most ambulance nurses are nurses working in the hospital ED and during their shift they may be dispatched to an emergency scene. In two hospitals involved in this study, there were six to eight nurses working in each hospital ED. The ED workload is sometimes overwhelming for the emergency staff, so providing nurses for an ambulance response exacerbates the staffing situation within the ED.

“For prehospital setting? Even for in-hospital, we were overwhelmed, providing prehospital care might be worsening. We were overwhelmed because there was only one staff in a shift for a day. On the other hand, we had problems inside the ED such as patient referral. So, if we were asked to provide prehospital care service, we couldn't do that” (P6)

Competence of ambulance staff

The competencies of both nurses and medical doctors working on ambulances are questionable. Nurses working on an ambulance were less-confident and lack the knowledge

and skillset required to provide adequate prehospital care. There are no standardised competencies for healthcare providers working on ambulances in Indonesia. Undertaking hospital-based emergency care training does not guarantee hospital staff are competent in providing prehospital care, it is a different environment requiring different equipment and skills.

“So, for this human resources, erm, I’ve seen several cases related to human resources, erm, some of the staff did not fully understand the prehospital care system. For example, I often see in the case of patient referral, the staff did not stay at the back with the patient, but sitting at the front row” (P6)

“If I look around at the provincial hospitals, when I had a discussion, the medical doctor is excellent in emergency medical technique, but if discuss about the system, they don’t understand it” (P1)

Issues with non-health worker involvement

The use of non-health related staff in the management of the ambulance service provided by the hospitals, such as ambulance drivers and radio medic operators, adds another level of complexity to the un-organised EMS system in Indonesia. Several hospitals did not have a specific radio medic operator so a nurse in the hospital ED has to perform this task. The number of ambulance drivers in most cases is insufficient, plus there is no standard on how to drive an ambulance in an urgent and non-urgent situation.

“During the patient referral, erm, doing, erm, driving the car (ambulance) is not based on standard. For example, the speed is above the average, too much use of siren for quicker access, but disobey the safety of the patient on the car (ambulance), his own, and safety of others. So in several cases I found that ambulance hit someone, the

ambulance went into a rice field. When the driver was interviewed, why did he drive like, erm, street cannibal? He mentioned, if not, the patient could be died on the car (ambulance). Why is that? Because there is nothing (facilities) on the ambulance” (P6)

Problems at the hospital level

The ED hospital management have influenced the development of the EMS system in Indonesia. This factor includes insufficient hospital ED networking, less-organised prehospital system and ED management, and bed block.

Insufficient hospital ED networking

The underdevelop EMS system in Indonesia causes imbalanced patient load in the hospital ED. This can be caused by the absence of an ambulance call centre which should be able to organise the admission of patients transported to the ED by ambulance. The implementation of the BPJS has not improve the imbalanced load, it has tended to make the patient’s waiting time to be seen escalate in at least one hospital ED. Since the ambulance service is hospital-based, every hospital has its own emergency number, therefore, the community tend to call the biggest hospital for an ambulance or arrive at the ED of the largest hospital in their own vehicles.

“Why do (the patients) pile-up at only one hospital? Because no one organised it. As a result, X hospital is overcrowded, but there is no patient at other hospitals” (P6)

“After that, erm, we had 27 (ambulance dispatching) in average in a day with four ambulances. Four ambulances with three teams. That was, erm, became a problem. Because of what? Working individually, in one point” (P3)

Unorganised prehospital support system

The ambulance services in Indonesia are predominantly hospital-based and patients tend to call the hospital directly. There is no national emergency phone number, similar to that in

developed countries such as the USA (911), Australia (000) or the United Kingdom (999). Likewise, there is no central call centre for police, fire or ambulance, like in the developed countries, that then organises the closest and most appropriate hospital.

“That’s it! It may be caused by lack of financial support, so, I can say that the preparation, not yet, not completed. The call centre, the 118 should be organised completely, including the establishment of the call centre, the staff, the agency, and the ambulance vehicles. The communication, transportation must be established. Skilled staff” (P2)

“So, there was unorganised. The TELKOM (telecommunication provider) only provided the number. TELKOM was the only one at that time, right?” (P2)

Lack of prehospital experienced hospital ED management

Not all hospital EDs in Indonesia are managed by medical staff who understand the hospital emergency and prehospital care well. Many hospitals do not have a well-organised hospital ED or ambulance service.

“So if we talk about the ambulance system, why it doesn’t become a priority in all hospitals in Indonesia? Because the medical doctors organising the ED do not think about the emergency as a system” (P1)

“So, the design of ED is incorrect. This is because the coordinator of emergency care in the Ministry of Health was a dentist who never worked at ED. As you know at ED, it has surgical emergencies and non-surgical emergencies. So, all is messed-up” (P5)

Slow ED patient throughput

Like other countries internationally, bed block is just one of many problems experienced by the hospital EDs in Indonesia. It creates a higher workload for emergency staff and hence it affects the prehospital care services the ED is able to supply. The implementation of the BPJS is one of the main causes of the bed block.

“Actually, based on human resource need calculation, I’ve analysed for the ED. If there is no patient stagnancy, it was enough. But because there was a patient stagnancy, cannot be admitted but it should be admitted already, it creates a high workload for nurses. So the nurses not only provide care for emergency patients, but also for admitted patients. Many factors caused this problem, one of them is the absorption for in-patient wards, the imbalanced between discharged and admitted patients” (P6)

Community awareness

The community, as the client of the ambulance services, influenced the establishment of the recently announced EMS system in Indonesia. Four sub-themes arose including lack of awareness, the misuse of the call centre, the influence of Indonesian culture, and public trust.

Lack of awareness

There is a lack of awareness by the community about importance of a functional EMS system. The community’s ability to provide basic life support, including calling for help, is limited. The government and health-related professional organisations contribute to the lack of community awareness about prehospital care and the benefit it can give. This lack of understanding also includes the value of a centre ambulance call centre and the roles it plays in a modern EMS system. The concept of a “safe community” which can provide initial basic

life support, including activation of an ambulance, is not well understood by the general public or the government bureaucrats.

“I said, Oh, c'mon! It seems that chicken is more expensive than human's life in Indonesia, stupid right? That's how bad we are. Now you can compare, which one is easier, call for ambulance or call for McDonald? Calling McDonald, it will arrive within 10 minutes, ambulance? Hopefully, if God give a permit (P5)

Call centre misuse

The old call centre misuse was related to the community's awareness of the importance of the EMS system. Many fake calls to the previous 118 call centre were reported. Unfortunately, the misuse of the call centre was not only by the community, but also hospital staff.

“We had a call centre, it could be 500 calls per day, in average, majority of those 500 were kids played around, right? So, the true emergency calls were about 100 patients per day” (P5)

“Finally, they confessed, 80% of thousand calls per months were non-emergency. That's was beyond our expectation because those 80% were inappropriate, for example, some of calls were asking, where is the practice site of Doctor X? That was useless” (P7)

Cultural influence

Indonesian people believe that illness and death, including emergency cases, are a destiny that must be received as it is, “it is God's will”. In the case of disaster, understanding the culture of the local people will help during the evacuation process.

“Emergency cases were ignored, people in Indonesia believe that someone died is a destiny” (P1)

“So the culture, for evacuation people in Papua, bring their pigs, because the pigs sleep together with them, bring the pigs! You have to know the culture” (P5)

Public trust

The inadequate implementation of the previous 118 EMS system effected the trust of the community. The community tended to go to the hospital ED by themselves due to an unreliable ambulance service and the high cost of it.

“It might be caused by incomplete preparation, so the infrastructure was not well-organised. When the people call, no one response it, as a result, the people do not trust it anymore” (P2)

“Then, there were several complaints from the community, not just an expensive service but also late response and others” (P3)

Insufficient ambulance vehicles

A modern well equipped ambulance is essential for an EMS system and as a mobile platform for providing prehospital care. The inadequate ambulance vehicles, both the quantity and the quality, also contributes to the under-developed EMS system in Indonesia.

Limited number of ambulance vehicles

The number of ambulances were limited in the hospitals involved in this study. This is because the ambulance was not used only for prehospital services, but also for referral and other non-emergency transport. Therefore, several prehospital cases could not be managed due to an unavailability of the ambulance.

“X (hospital) has 8 or 9 ambulances. But we only have two which we asked specifically. Because the others only for transporting corps, not really well-equipped in here. Those two ambulance, one has more equipment, I put it at low ground (ED). I asked a fully equipped ambulance with AED, defibrillator, and others” (P2)

Low standard ambulance vehicles

This study discovered that the physical condition and the facilities inside the ambulance were of a low standard. The ambulances lack medical equipment such as a monitor/defibrillator, equipment for eye and ear, nose and throat (ENT) and trauma cases. This situation effects the quality of care provided by the prehospital providers.

“We agreed that, erm, one of obstacles for prehospital services is, first of all, the facility. Yes, facility. The most important thing is facility inside the ambulance. Ambulance facilities. If we refer to the standard of ambulance that, erm, provided by the Ministry of Health, I’ve undertaken a survey in X city, erm, the majority of hospitals and puskesmas, about 80% ambulances were under qualified, under qualified” (P6)

Traffic

Traffic is one of the main difficulties in getting an ambulance to the site of an incident in the major cities of Indonesia. The traffic jam mostly occurs during peak hours on the city roads and toll ways.

“The main problem in X city is traffic jam. So, from Y area to Z area, it takes time. Because there is a traffic jam on the toll way, but the regular road is worse” (P1)

“First of all, traffic jam tends to happen in Z city, almost like X city, for certain times, certain times. In front of Z area, at 4PM, slow motion” (P6)

Solutions to implementing an EMS system in Indonesia

Five themes emerged from the data for providing solutions to the implementation of an EMS system in Indonesia. It comprises implementation of the EMS system, creativity at the local health facility level, enhancing prehospital providers' capacity, government support, and community empowering (Table 4).

Implementation of the EMS system

Participants in this study suggested that Indonesia should implement a national EMS system. It could be done by developing a call centre, starting from something small, developing the EMS system in stages to meet the needs of Indonesia, empowering the local health facilities, establishment of a hospital network, and collaboration with other EMS system and prehospital care provider stakeholders.

Development of a Call Centre

The call centre is essential for the overall functionality of an EMS system. The establishment of the call centre will enable the provision of prehospital care services in a timely manner taking into account the traffic and hospital ED throughput close to the incident. The participants believed that if the SPGDT is well-implemented, it can functioned as the call centre. A better co-ordinated approach as a result of using a call centre will hopefully improve the ambulance response times and lead to improve survival rates for patients delivered to the hospital ED by ambulance. A more efficient collaboration between the BPJS and most hospitals may also improve the functionality of the call centre.

“The previous 118 system, one of its limitation was it was not centralised. It was managed, erm, without involving all healthcare providers in X city. So, erm, I reckon, the call centre should be centralised. Only one centralised call centre” (P6)

Start from something small

The EMS system involves other components of the total healthcare system, including other organisations and the various levels of government. The absence of national regulations covering prehospital care is a major deterrent in establishing an EMS system. The participants suggested implementing the EMS system in specific locations and piloting the processes and then expanding the system across the country once the overall system is running smoothly on a local basis.

“So, we really want, as well as Provincial Health Department, we start something little. To build the big system of the SPGDT, we build bricks in here, the other also build bricks, so all will be developed. We want it” (P2)

“But I think, if we have one which is good, as a pioneer, it will be a pilot project” (P3)

Create an EMS system that suits Indonesia

Developing an EMS system in Indonesia is challenging due its unique characteristics such as the dense population, the archipelago, and the long distances in some areas of the country. Participants in this study suggested that the EMS system should be modified to suit the Indonesian settings, such as using a motorcycle as the first responding ambulance, which is simultaneously dispatched with an ambulance vehicle, but will normally arrive before the vehicle due to its ability to manoeuvre through the traffic.

“The problem is when there is an emergency case, we usually dispatching a small ambulance. X city’s traffic jam, it can go through small roads, right? Motorcycle (ambulance) is lots faster, right?” (P5)

“Secondly, I can see that, creating a system which is easy to be accessed during emergency cases. What kind of system? Car, impossible. Motorcycle, impossible. The motorcycle is now having difficulty. The ambulance motorcycle should not a small one. It must be able to carry a DC shock and others, so it should have a compartment at the back” (P1)

Empowering the local health facilities

This participants suggested that the *puskesmas*, as a local health facility, should be empowered to enhance the quality of the EMS system in Indonesia. In general, a *puskesmas* is located close to the community, therefore, in the case of an emergency, the *puskesmas*-based ambulance services might reach the incident site quicker than one from a hospital.

“Develop a service which is close to the community, meaning that the emergency service in puskesmas must be good. So, if for example, we have a healthcare provider in here. He must be able to provide an emergency care. So, he will come, call the puskesmas, (the puskesmas) will arrive here, easy right? Using a back door bringing all kits” (P1)

“But as the spearhead of prehospital care, it should empower the potential capacity for (health) care from other hospitals and puskesmas. So, in the case of emergency close to X hospital, no need to be picked-up from the distance hospital, the X hospital should pick it up. But must be via a call centre” (P6)

Develop a hospital network

Participants in this study suggested that hospital networking should be developed to improve the prehospital care in Indonesia. All hospitals must work together to establish the EMS system, as well as providing some financial contribution.

“In the future, I believe, we have to, erm, what’s that called? Erm, integrated. We sit together with all hospitals and must have a coordinator, the stakeholders. We sit together, the stakeholders as the decision makers, and funding support. It is impossible without any funding support. We sit together. That is what we want. So, every single hospital knows its role and willing to be involved. Don’t be only knowing the patients but don’t want to be involved. So, (they) must be able to work and work together, that’s what I mean” (P2)

Stakeholder Collaboration

All stakeholders must work together to establish and run an EMS system, including all levels of government, the private sector, and community must work together to establish and work within the EMS system in Indonesia. Supporting organisations such as the insurance companies, Red Cross, fire department, and the Parliament must also be involved with the collaboration.

“Three pillars, the government, private sectors and community. All needs to back-up” (P3)

“And how sustain, reward, and punishment, it should be all together, should be thought together. We cannot only burdening the government, they couldn’t be able to handle. Even the (Ministry of) Health as the main player couldn’t be able to handle it. We can develop, if all those people” (P3)

Creativity at the local health facility level

There is a lack of national regulations covering the provision of prehospital care, even though there is a demand for the service from the community. Therefore, the hospital and ED directors must be creative in providing a service that meets the community needs. The creativity includes developing a hospital-based EMS system, creativity on budget support and equipment, and creativity for communication devices.

Hospital-based EMS system

Participants in this study suggested developing a hospital-based EMS system by establishing a hospital-based call centre, ambulance team, and in-house training for ambulance staff.

“That’s why I thought that, I walked alone, I meant, did not involve, erm, the Health Department because I am not sure they will (support). This is because it (the system) is for our own concerns. We have created the EMS team, last December” (P2)

“Actually the team has been established since a long time ago, we train every day, the paramedic staff, about CPR and others. And then we establish with the Director Decree, the EMS. But we haven’t been brave enough to launch the phone number, even though the launching, we have the number, I bought by myself, 8074XXX” (P2)

Creativity with the budget

As there is no funding support from the government or hospital management, the ambulance service manager utilises several options for funding the running of the ambulance service. These options include selling gifts and services to cross-subsidise the current ambulance operations.

“That’s the reason why there is a shop there, a shop. We sell some stuff, some stuff. We have a copy machine. That’s it, the profit (from the shop) has been used for operational needs, not from the government” (P6)

“That’s it, manage by themselves, we close our eyes. Even though it should not be like that, but for what? So it won’t be functioned? How they do the double shift, how much they are going to be paid, I don’t know. They manage themselves, as long as it runs. The question is, the community is different and happy. If we stick with the rules, wow, 15 ambulances with 4 people is unbelievable” (P7)

Modified medical equipment and interventions

Most ambulances in Indonesia lack up-to-date medical equipment due to limited funding support. Therefore, equipment has been modified by local sources to meet the needs of the ambulance staff. Aside from the modified equipment, alternative devices and procedures are used because this is all that is available within the current budget, such as the use of banana stems for fracture management, the use of banana leaf for hypothermic babies, the use of traditional clothes (*sarung* and *gurita*) for fractured pelvis management, and a water filled balloon on the end of a straw for post-partum bleeding.

“So, the basic life support is how to control health. (Undertaking) resuscitation without tools is about similar with fighting without weapon. So, about the splinting, how do we splint? We don’t have a vacuum splint, right? Air splint? Nothing. What else? So we should teach, pelvic binder? Nothing, but we have a “gurita” (a traditional clothes for post-partum corset), put it on, pelvic, stop the bleeding” (P5)

“So, I said, if you are in rural areas, you plant a banana. In the case of leg fracture, that banana tree can have mother, father, grandmother, grandfather and others right?”

The size is varied. Right, what size is it (the fracture)? The banana steam, right? A curved shape, analgesic, feel cold, right? It has a curved shape, cold feel for the analgesic, right? And even it has the rope” (P5)

Creative communication tools

Participants in this study recommended the use of alternative communication services for the call centre, plus communication among prehospital providers, police and fire department. The use of portable radios, a radio medic, and ORARI (a national organization for amateur radio enthusiasts) are some alternative communication tools. The use of alternative communication devices was suggested because the call centre may not be fully functional in all areas initially.

“Currently, it is encouraged to use the radio medic. In X city, we have coordinated with the Police Department so we can have all radio medic (numbers) for all hospitals in X city, which is probably for the whole X province in the future. X city and surroundings become a pilot project, so, our radio, erm, the frequency has been locked by the Police Department, this to this frequencies, not other frequencies, cannot be transferred to others. We do hope, in the case of patient needs an ambulance, the patient will call, call to everywhere will be received and will be informed which (hospital) can receive depends on the case” (P7)

Enhancing the prehospital providers capacity

There is a need to enhance the prehospital care providers’ capacity to manage more conditions in the prehospital setting. This includes the competency enhancement of the ambulance staff, providing guidelines for prehospital providers, and empowering team work.

Increase the competency of ambulance staff

Prehospital care education is needed for nurses, physicians, police officers, fire fighters, as well as hospital managers. An update on prehospital knowledge and skills is required to refresh and extend their competencies.

“The first Bali blast, total chaos, right? The second Bali blast, perfect! Do you know why? Because an Australian came to me, “Can you make, erm, safe community in Bali?” “Yes, I can, but we have no money” “We will pay for it!” “Why?” I said. “Because there are more Australians in Bali then in Darwin” he said. “OK, we’ll do it”. So, for 14 days, I had trained hospital Directors, the HOPE course, Hospital Preparation for Emergency. So the Directors know how to prepare the ED for both daily emergency and disaster. I had trained ED nurses and physicians. Emergency physician, emergency nurses. Ambulance officers had been trained together with police officers, and fire departments” (P5)

“Secondly, the refreshing for the health workforce, the refreshing. We are going to work with police department. We do train every day, we do socialisation in X city and surroundings every day. Our training department is never had a break” (P7)

Clear guidelines for prehospital care providers

It is suggested that nurses working on an ambulance and in the hospital ED should have a clear set of clinical practice guidelines when they are outside of the hospital environment. The guidelines should include the clinical authority for undertaking interventions for both nurses and physicians and should be based on knowledge and skill competencies.

“Emergency nurses, the main (role) is the emergency care, both prehospital and intra hospital. Either there is a doctor or not, they should have an authority to do so. The

authority is based on competency. There is a fresh graduated doctor, cannot do (certain procedure), but if he has an authority, he does it, or he gives the order. In the future, if a nurse has an authority, if the doctor who haven't achieve the competency, that nurse can do it and becomes a team leader" (P1)

Empower team work

Prehospital care involves several professionals including nurses and physicians, and occasionally other emergency service staff. Participants in this study suggested that team work must be enhanced among those professionals for the ambulance and ED services to provide a better level of patient care.

"So, the nurse team has been fixed, but for medical doctor team, medical doctors who are on anaesthetic (department), there are 4 biggest (departments) who are on anaesthetic (department), surgical, internal medicine, paediatric, and obstetric. What is the case? If obstetric case, pick from obstetric and anaesthetic. If surgical (case), we ask a surgical (doctor). So, (from the) telephone, ask what the case is to determine which medical doctor team (to be dispatched). So, not only paramedics, but also the doctors" (P2)

"It's called emergency team. The team. The team is limited by a competency. What happened in ED is not like that. The role of emergency nurses, if no one care, either in hospital and ambulance, in the next ten years, they are going to be the nurses who are the most doctors ask to be commanded to. You can come to X hospital, "Nurse, please take the blood, please do that". Very sad!" (P1)

Government support

The Indonesian government has an important role in establishing an EMS system in the country. National guidelines covering prehospital care are required so that the local government can apply the regulation based on the national standard.

The establishment of government guidelines for an EMS system

The regulation from the Ministry of Health is the key for the establishment of an EMS system. The regulation functions as an overarching umbrella for the prehospital care services, including laws for the protection of the prehospital health providers.

“That’s it. Back to the, if we can adopt, erm, the regulation, the regulation is the principle. The regulation from the Ministry of Health, then it should be developed into a project, a project at local area. Erm, the stakeholder must be the local (government)”

(P3)

“In order to solve the prehospital problem as part of the emergency care, it depends on the government regulation. The funding support, both for facilities and the most important thing, I reckon, is education” (P4)

The role of local government

The local government and the Health Department for each district, should organise the EMS system within its coverage area. The local government must work on both the system, financial support and education for the ambulance staff and others associated with the EMS system.

“I can say that, the local government. The local government must be able to do so. They must be able to establish a management, a good system, both financial support and education” (P4)

“I think it needs an intense approach to the Health Department with all data which can be used as reference, mortality rate, morbidity rate, that, that, that is available in every districts, which has been increased every year. It must go through the Health Department” (P6)

Community empowering

The community should be empowered to assist in the successful implementation and running of an EMS system in Indonesia. It can be done by providing education to the community about prehospital care and how to change their lifestyle.

Educate the community

The community need to be educated about providing help to an injured person in an emergency situation. The education should cover the basic principles of lifesaving intervention for lay persons, such as chest compression only resuscitation, basic first aid, and the importance of calling for help early. The education should also be provided to the special population in the community such as local guards, called Pecalang in Balinese culture.

“Even though the government has a good budget, the community needs to be educated. What is emergency, what is SPGDT, what is their role? Even though we have it, prepare for it, but if (they) do not know, it’s just the same. All within the system needs to be run well, they must be educated. Meaning that we publish, give an education, we have this and that, their role is this and that, the advantages and disadvantages, right?” (P4)

“It is now, elementary students do not know, junior high school students do not know where they should call (in the case of emergency) and others. That’s basic ability in other country, that’s basic knowledge, we don’t have it” (P1)

Change the community lifestyle

The community should be educated about how to change their lifestyle so that the morbidity rate can be reduced. The education should involve in how to organise rooms in the family home in order to reduce the incidence of emergency cases in household and to make it easier when evacuating a person from the house, should it be needed.

“The people will not directly to the heart disease stage if the promotion and prevention is good. That’s the main thing. So, community’s life style must be enhanced” (P1)

“I can say that, the majority of burn trauma in here is caused by the explosion of the green gas tube. But in a slum area, I told them, “Do not cook inside the house, cook at outside the house”. If it explodes, it will go out, your house will not be burnt, and there will no blast injury, right?” (P5)

Discussion

This study discovered that several elements were identified as barriers in implementing an EMS system in Indonesia. The Indonesian government’s roles in establishing a well-organised EMS system became one of the main issues. Both the national and local government lack awareness in the importance of the EMS system as prehospital care is not a health development priority in Indonesia. The government focuses on in-hospital emergency care instead of prehospital emergency care. It can be seen from the fact that there is a national regulation of ED in Indonesia which controls the classification of ED, the human resources,

and physical and medical facilities within the ED [11]. However, there is no standardisation of the ambulance services provision including the ambulance system, the standardisation of ambulance equipment, and the prehospital human resources. Therefore, the prehospital care is varied across the country, which predominantly lacks organisation as multiple levels. It is expected that the pilot project of the 119 EMS is the initial movement of the Indonesian government in providing better prehospital care, however, there is a long way to go.

Trauma caused by road traffic accidents is becoming one of major issues in Indonesia as 90% of global injuries occurred in the LMICs including Indonesia. For example, there were 13,383 out of 26,907 (49.7%) trauma cases admitted at Saiful Anwar hospital in 2007, one of provincial government hospitals in Indonesia [8]. However, these high numbers of trauma cases did not become a trigger for Indonesian government to provide a better prehospital care. Similarly, the government of Pakistan viewed the road traffic accidents as transport related and therefore a police department issue, and not a public health problem [12].

Financial support from the government is needed to establish a well-organised prehospital care system. However, as the prehospital care is not a priority of the Indonesian government, the budget allocation for prehospital care is limited. There is no published data on how much money has been spent by the Indonesian government for trauma care, however, compared to Malaysia, the government there has spent more than USD 1.5 billion per year for the care of injured patients [13]. A study by Suryanto, et al. [1] found that financial support and the low level of people's income are the two biggest problems in establishing an EMS system among LMICs such as Sri Lanka, India, Ghana, and Armenia.

Furthermore, as it is not a government priority, there is no national standard for prehospital care that can be applied in all areas in Indonesia. The 119 EMS is now established at 27 locations in Indonesia as a pilot project. However, it is believed that a lack of infrastructure

and resources, the delay in responding and transferring calls are several of the challenges in the early stages of the pilot program [4, 14]. The establishment of the 119 EMS requires a legislative framework as an umbrella for all elements in prehospital care including related organisations and human resources. The framework then can be applied at other areas where the 119 EMS has not been established. However, establishing the framework appears not to be a priority of the government. The legislative framework in Punjab, Pakistan was passed twenty months after the establishment of the 1122 EMS system [15].

Human resources in prehospital care is another of the issues that affects the implementation of an EMS system in Indonesia. Since a prehospital specific health worker such as a paramedic is not recognised in Indonesia, nurses are responsible for staffing the ambulances in Indonesia [16]. However, there is no regulation covering human resources used in prehospital care in Indonesia, both the education background requirement and the career pathway for the ambulance nurses. As ambulance services are either *puskesmas* or hospital-based, the ambulance nurses are not only responsible for the prehospital patients, but patients who are admitted to the *puskesmas* or hospital ED. The numbers of nurses working at a *puskesmas* or hospital ED are usually not excessive, therefore, extra responsibility for the prehospital care creates additional workload and tends to effect the quality of patient care. The lack of qualified human resources for prehospital care has been experienced by other LMICs including Morocco where only one in three prehospital care providers was trained in prehospital care [17]. Nigeria has a similar experience where prehospital care providers are inexperienced and overworked [18].

Furthermore, those nurses working on ambulances lack prehospital care specific knowledge and skills as prehospital care content is limited within nursing curriculum in Indonesia [19]. Compared to other countries, Malaysia implemented an organised EMS system before

Indonesia, however, the mortality rate of trauma patients remains high with one of the possible causes being the untrained ambulance personnel as there is no formal curriculum for prehospital care providers [13]. Sweden has similar system where nurses are staffing the ambulances with no national regulation covering prehospital education for those nurses [20]. The nurses also lack the required of knowledge and skills set to function effectively in the prehospital setting [21].

Since there is no national standard for an EMS system in Indonesia, the prehospital care depends on the hospital and *puskemas* ambulance service management. Due to different ambulance equipment and the accessibility to the ambulance services, the community tend to call for a hospital-based ambulance service. However, the network covering prehospital care between hospitals is insufficient. As a result of community favourability, the patients may gather in one certain hospital ED, this leads to excessive ED workload in a certain hospitals but a decreased workload at other hospital EDs.

The community is also a significant barrier to implementing an EMS system in Indonesia. This study revealed that the community lack the understanding of the importance of an EMS system, with misuse of the previous 118 call centre being an issue. The public trust with the ambulance service is low with most patients brought to the hospital ED by non-ambulance vehicles and only 11% of patients using an ambulance [8]. It becomes a vicious cycle when healthcare providers are unable to provide an adequate ambulance service, it creates less public trust in the ambulance services and their provision of a service. The low utilisation of ambulance services has also occurred in Pakistan where, culturally, the community tend to take the an injured or ill person to a hospital ED directly [15]. Local culture influences how the people seek help for health related issues with this study discovering that the belief of

“God’s will” among the community creates an attitude that illness is a destiny that must be received.

An ambulance is one of key element of an EMS system, however, this study revealed that the number and quality of ambulance vehicles in Indonesia is low. In general, *puskesmas*-based ambulances are less well-equipped than hospital-based ambulances. But, this study discovered that hospital EDs also lack of well-equipped ambulance. Poorly equipped ambulances is a common problem in LMICs, countries such as Nicaragua and Morocco have a similar problem where ambulance vehicles are used primarily for transporting medical staff to clinics and equipped predominantly with first-aid equipment only [1].

Traffic congestion is another issue to deal with when implementing an EMS system in Indonesia. The economic development in society increases the number of private cars in the country. Most major cities roads are packed with private cars especially during peak hours which make it difficult for ambulances to have an easy thorough fare. The low community awareness of the need to give way to an ambulance aggravates the situation of getting to an incident within reasonable time. Similar to Malaysia, public awareness about the importance of prehospital care is one of major obstacle in improving access to prehospital care [13].

Levine, et.al. [9] contend that there are three categories of barriers to developing prehospital care including obstacle in the community, during transport, and on arrival at the health facility. The results of this study revealed that Indonesia is experiencing all three of the barriers. The archipelago of Indonesia may worsen the situation due to the number of island, the isolation of some islands, and the small population of some islands. This is because establishing a national standard for an EMS system may not be applicable to all areas in Indonesia. The infrastructure and human resources capacities are varied across the country with Java Island being the most developed area. Therefore, most areas involved in the 119

EMS system pilot project of current 119 EMS system are located on Java Island [5]. The implementation of the 119 EMS system in other less urban areas and the smaller and remote islands remains doubtful.

In order to overcome the barriers to implementing an EMS system in Indonesia, participants in this study suggested several activities including initial implementation of the EMS system, enhancing the local creativity, improving the current prehospital proficiency, support from all levels of government, and empowering the community. The implementation of the EMS system really needs to start with the establishment of a call centre. The current 119 EMS system has a call centre, however, the call centre is not as effective as a call centre in developed countries, such as Australia, New Zealand, The United Kingdom and the USA. Each call is received by an operator at the NCC in Jakarta then it will transferred to the PSC closest to the incident site, meaning that the NCC cannot directly dispatch an ambulance from either a *puskesmas* or hospital, the PSC must do this [16]. Within the current system, a delay in transferring calls from the NCC to the PSC is one of the obstacles in providing an ambulance to the site of an incident within a reasonable time frame [4].

However, the establishment of 119 EMS system is a good start for a prehospital system in Indonesia. Unfortunately, only 27 locations have been involved in the current pilot project. It is expected that the current system will be expanded to all areas in Indonesia. A qualitative study conducted in Boyolali in one of the areas implementing the 119 EMS system shows that the system is effective in providing an information, but the performance is less than optimum, the human resources are inadequate, and the information uptake by the community is insufficient [22].

The current 119 EMS system was implemented by the establishment of the Tulungagung Emergency Medical Service (TEMS) [16]. This supports the results of this study where the

establishment of an EMS system should be with something small based at the local level. Even though the current 119 EMS system was implemented at 27 locations in 14 provinces, the number of locations is small because there are 514 districts and 34 provinces in Indonesia. Therefore, empowering the each district to be proactive in establishing its own EMS system is one way to ensure local participation in a national project. The hospital EDs in each area have an important roles and there is a need for those hospitals, both private and government, to work together with prehospital stakeholders including the insurance companies, Red Cross, fire department, the Parliament, and community. The development of EMS system in Sri Lanka involved several elements including Red Cross, private hospitals and ambulance services, foreign aid, and community-based organisations [23].

Local creativity is one of the suggested solutions to implementing an EMS system in Indonesia. Support from both the national or local government is limited, ambulance providers, mainly hospital EDs, need to be creative in budgeting, using local sources to manufacture and source ambulance equipment, and using alternative communication tools. Creativity with prehospital care was experienced in Thailand where a non-governmental organisation provided an ambulance services using a modified pickup truck with some of the equipment made locally, a homemade spinal board [24].

Enhancing the ambulance providers' capacity is also crucial to establishing a well-organised EMS system in Indonesia. The competency of ambulance nurses, as the main ambulance providers, needs to be increased. As prehospital care content is limited within the nursing curriculum in Indonesia, additional training or courses for those nurses in managing prehospital patients is important. The Australian Department of Foreign Affairs and Trade through the Australia-Indonesia Institute has funded two projects to improve prehospital care in Indonesia. The first project was the development of an ambulance nurse course curriculum

which involved staff from two Australian universities, Monash and Griffith University plus staff from the Brawijaya University in Indonesia [14]. The second project was the piloting of the ambulance nurse course with ambulance nurses from both the *puskesmas* and hospitals in Malang, East Java. It is expected that over time Brawijaya University will run the course with assistance from Monash and Griffith University staff. In future there will be a broader range of ambulance nurse participants with the establishment of a nurse specialist program (emergency nursing) at Brawijaya University. Sharma and Brandler [25] suggested that courses for prehospital care providers should be accredited by a national authority, with the focus not only on the healthcare providers, but also for police officers, fire fighters, college students, taxi drivers, and working adults.

The government is the key of the implementation of an EMS system in Indonesia. A national guidelines and regulation covering an EMS system needs to be established. If there is no national standard for the system, the demand of ambulance services will stimulate local ambulance providers to create a system which suits their needs, therefore, the variation in the EMS systems across the country will lead to a dysfunctional system that still doesn't meet the needs of the population. As the second most populous country in the world, India does not have centralised EMS system and similar to Indonesia, the absence of a national standard for the EMS system creates a variety of the services, providing various levels of care without standard EMS protocol, and lack of coordination with police and fire department [25].

However, the regional (provincial government) in Indonesia may have its own regulation and structure for the EMS system which may be implemented in all districts within the province. However, a national framework for the EMS system is essential as it provides an umbrella for the functionality of the EMS system and ambulance services in Indonesia. Based on the experience in Pakistan in developing a successful EMS system, providing a legislative framework and establishing an organisational structure is two of keys in developing a

functional EMS system [15]. Similar to India, the government funding for the EMS system is limited and it is suggested that the government should attract private investment to increase the budget [25]. Financial and educational assistance from developed countries may enhance the capacity of developing countries to fast track the development of an EMS system, as was experienced by Pakistan [15], Sri Lanka [23], and India [26].

The community as the customer of the ambulance services needs to be empowered by providing an education around the importance of the EMS system and the benefits of changing their overall lifestyle. The misuse of the previous 118 ambulance services may decrease if the community are aware of the prominence of the EMS system. If the community are aware of and actively involved in the development of the EMS system then they will be more likely to promote and make appropriate use of the system. In Vietnam, the community has been empowered within the EMS system by the formation of the Village Health Workers (VHWs) group and health volunteers since 2010 [27]. The people were trained by local hospitals and were equipped with essential emergency equipment to provide support their village.

This study is potentially limited by involving hospital-based ambulance services only. However, as the majority of people in Indonesia utilised hospital-based ambulance services compared to a *puskesmas*-based ambulance services, the results of this study provides preliminary data for further research. This study involved six big cities in Indonesia, thus, it may not have captured the potential prehospital care problems in rural areas of the country.

Conclusion

Several barriers have been found to implementing a well-organised EMS system in Indonesia. Lack of support from the government is the main problem followed by inadequate human resources, problems at the hospital and community levels, insufficient and inadequate

ambulance vehicles, and local traffic congestion. This study suggested that the initial implementation of the EMS system is a necessity and the pilot of the 119 EMS at 27 locations in Indonesia is a reasonable start to solving the national EMS system problem. Local creativity is suggested when the area is not yet involved in the 119 EMS pilot program. Enhancing prehospital providers' capacity, government support, and community empowering are also suggested to build the system. There is an expectation that the 119 EMS system can be implemented in all areas of Indonesia so that prehospital care can be provided to all people within Indonesia.

For Peer Review

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Table 1. Provinces and hospitals involved in the current 119 Emergency Medical Service [5]

No.	Province	District/Hospital
1.	Aceh	Aceh
2.	North Sumatera	Medan
3.	Bangka Belitung	Bangka Regency
4.	South Sumatera	Palembang
5.	West Java	Bandung
		Bekasi Regency
		Bekasi City
		Cirebon Regency
6.	Banten	Tangerang Regency
7.	DKI Jakarta	DKI Jakarta
8.	Yogyakarta	Yogyakarta
9.	Central Java	Solo/Surakarta
		Wonosobo Regency
		Boyolali Regency
		Sragen Regency
		Kendal Regency
10.	East Java	Tulungagung Regency
		Tuban Regency
		Trenggalek Regency
11.	Bali	Denpasar
		Badung Regency

		BPBD Bali
12.	NTB	Mataram
13.	South Sulawesi	Bantaeng Regency
		Makassar
14.	North Sulawesi	Kandou hospital

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Table 2. List of questions used in the study

Topics	Questions
Care in the community	<ol style="list-style-type: none"> 1. What are the obstacles regarding providing care in the community when applying EMS system? 2. Was it easy for the community to access the call centre? 3. Was it easy for health care providers to be at the emergency scene? 4. How can these obstacles be solved? 5. How is the quality of the current EMS system regarding care in the community?
Care during transportation	<ol style="list-style-type: none"> 1. What are the obstacles regarding providing care during transport when applying EMS system? 2. How was the distribution of the health facilities? Was it influence the care? 3. How was the vehicle used for patient transport? Was it appropriate – quality and quantity? 4. How was the road condition? Was it an influence on the care? 5. Who paid for the transport? How much was the rate? If the patient must pay for the transport, was it affordable? 6. Describe the quality of care provided by health care provider during transport? 7. What were the qualifications of health care providers who could be first responders? Was there any training to be an ambulance officer? 8. What could health care providers do for patient care? Was there any limitation of authority for health care providers during transport?

	9. Were the facilities of the ambulance good enough to provide high quality of care?
	10. How can these obstacles be solved?
	11. How is the current EMS system regarding care during transportation?
Care on arrival at the receiving health facility	1. What are the obstacles regarding providing care on arrival when applying EMS system?
	2. Who were health workers who standby in the emergency department? Were there any emergency medicine specialist, physicians, nurses, social workers? What were their qualifications?
	3. How was the quality of health workers in emergency department? Were they well-qualified?
	4. How was the quantity of health workers in emergency department? Was the amount enough?
	5. Was there any training for health workers in emergency department? What kind of training was that? Who did the training?
	6. How was the medication for patients who come to emergency department? Was it good enough?
	7. How was the equipment at emergency department? Was it good enough?
	8. How was the management of the patient who are admitted to emergency department? Was there any standard operating procedure in regard admitting patient? Was there any mechanism for the triage of patients?
	9. How these obstacles can be solved?
	10. How is current EMS system regarding care on arrival at the receiving health facility

Table 3. Themes and sub-themes of barriers in implementing an EMS system in Indonesia

Themes	Sub-themes
Lack of government support	Lack of government awareness
	Lack of national guidelines on prehospital care
	Insufficient budget support
	Political issues
Human resources problems	No regulation for prehospital care human resources
	Limited amount of ambulance staff
	Competence of ambulance staff
	Issues with non-health worker involvement
Problems at hospital level	Insufficient hospital networking
	Unorganised prehospital support system
	Lack of prehospital experience hospital ED management
	Slow ED patient throughput
Community awareness	Lack of awareness
	Call centre misuse
	Cultural influence
	Public trust
Insufficient ambulance vehicles	Limited number of ambulance vehicles
	Low standard ambulance vehicles
Traffic	

Table 4. Themes and sub-themes of solutions to implementing an EMS system in**Indonesia**

Themes	Sub-themes
Implementation of the EMS system	Development of a Call Centre
	Start from something small
	Create an EMS system that suits Indonesia
	Empowering the local health facilities
	Develop a hospital network
	Stakeholder collaboration
Creativity at the local health facility level	Hospital-based EMS system
	Creativity with the budget
	Modified medical equipment and interventions
	Creative communication tools
Enhancing the prehospital providers capacity	Increase the competency of ambulance officers
	Clear guidelines on prehospital providers
	Empower team work
Government support	The establishment of government guidelines for an EMS system
	The role of local government
Community empowering	Educate the community
	Change the community lifestyle

5.3 Chapter Summary

This study showed that establishing a well-organised EMS system in Indonesia is a complex issue. Several factors were identified as contributing to the problematic implementation of the EMS system, including the lack of government support for prehospital care and services, lack of qualified human resources, ambulance management problems at ED hospitals, lack of community awareness regarding prehospital care, limited numbers and standardised ambulance vehicles, and traffic. The implementation of the current 119 EMS system in 27 locations in Indonesia was an excellent start that could encourage other areas to adopt the system. It is targeted that the system should be implemented in all areas of Indonesia by July 2018, two years after the launch of the system (Kementerian Kesehatan Republik Indonesia, 2016a). Study Three also emphasised that the ability to provide care in the prehospital setting of ambulance nurses should be enhanced. This finding was in accordance with the results of Studies One and Two, where both nursing graduates and ambulance nurses felt they lacked the competence required in prehospital care. Chapter Six follows with a discussion of the three studies of this research in the context of the evidence and the “People Centred Health Care” framework.

Chapter 6 Discussion

6.1 Introduction

This research consisted of three main studies concomitant with four domains of the “People Centred Health Care” framework created by the World Health Organisation (2007): individuals, families, and communities; health practitioners; healthcare organisations; and the health system. Studies One and Two examined the “health practitioners” domain, and Study Three examined “individuals, families, and communities’, “healthcare organisations” and “health system” domains. Therefore, this research had two main interests: human resources in prehospital care and the prehospital system.

Human resources are an important element of health services, including prehospital care. However, there is no specific healthcare provider in the prehospital setting in Indonesia. Nurses working in hospital EDs and *puskesmas* staff ambulances, but they are not well-prepared for this work because the nursing curriculum in Indonesia has limited prehospital care content. Therefore, it was important to investigate the capacity of ambulance nurses to provide care in the prehospital settings.

Hospitals and *puskesmas* are the two main health facilities in Indonesia for in-hospital and prehospital care. This is because ambulance services in Indonesia are either hospital-based or *puskesmas*-based. In either case, ambulance services are not well-organised. The current 119 EMS system was launched in 2016. Regulations by the Ministry of Health of Indonesia seek to implement this system in all areas within two years of the initial launch. This means that all 514 regencies/cities in 34 provinces must implement the system by 2018. However, there was no published data showing the progress of this implementation one year after the launch, and the system had not been implemented in Malang at the time of writing.

Ambulance use is low in Indonesia. This may be due to the lack of an organised EMS system, making it harder to call an ambulance than a taxi. Most people also feel that ambulance services are expensive, as most health insurance programs do not cover ambulance services, unless one has private health insurance. The universal health insurance programme (BPJS) likewise does not cover ambulance services for prehospital care except for referral purposes. This situation is thus an obstacle to implementing and usage within the new system.

This chapter begins with a discussion of the perceived competencies of ambulance nurses obtained from the results of Studies One and Two, followed by a discussion on how to improve the EMS system in Indonesia based on the results of Study Three. The last part of this chapter presents the study's limitations.

6.2 Indonesian Ambulance Nurses' Competencies in Prehospital Care

The "health practitioners" domain of the framework mentioned that competent health practitioners are required in health services (World Health Organisation, 2007). One strategy to produce competent health practitioners is to promote and integrate core competencies in all education and training programs. As the prehospital care provider position is not yet recognised in Indonesia, nurses are responsible for staffing ambulances. Studies One and Two of this research investigated the prehospital care competencies of nurses from educational and clinical practice perspectives.

As mentioned, prehospital care content within undergraduate nursing curriculum in Indonesia is perceived by nurses as limited. Prehospital care is currently part of the emergency nursing content, which takes up four out of 104 credit points (Kolegium Ners Indonesia, 2015). Not surprisingly, the results of Study One showed that nursing graduates lacked practical skills related to prehospital care, such as loading and unloading a stretcher, checking and restocking equipment inside the ambulance, driving the ambulance safely, and using the ambulance communication system. Limited prehospital-

specific content in the nursing curriculum has also been reported in the United Kingdom, Ireland, and Sweden (Ahl & Nystrom, 2012; Melby, 2000, 2001).

The “People-Centred Healthcare” framework shows that proper education and training are the key to producing competent healthcare providers (World Health Organisation, 2007). Programs should start by identifying core competencies, in this case, the competencies of nurses staffing ambulances in Indonesia. Then, those core competencies should be integrated into nursing education and training. The framework also emphasises the importance of skill-oriented curriculum within health-related education and training. Despite the fact that nurses staff ambulances in Indonesia, Study One of this research showed that nursing graduates lacked prehospital practical skills, which was possibly caused by the limited content on prehospital care in the national nursing curriculum. Although the national nursing curriculum provides the core curriculum for nursing education in Indonesia so that nursing education can be standardised, each nursing education centre can add specific content based on local needs. Prehospital content may need to be added in both academia and clinical practice in nursing education in Indonesia. The alternative approach would be to provide nursing graduates seeking employment in prehospital care with postgraduate highly targeted training. This would not only assist with up skilling of new employees but provide a more focussed training program which could also assist with upskilling of current employees.

The results of Study One were concomitant with those of Study Two, where ambulance nurses had limited knowledge and practice of prehospital care. The competencies of healthcare providers depend on education and training. Nursing education in Indonesia should be able to accommodate the skills required in all clinical settings, including prehospital care. Unsurprisingly, Study Two showed that knowledge and practice in prehospital care among nurses staffing ambulances were limited. Interestingly, Study Two showed that emergency training had a significant contribution to the knowledge, attitudes, and practice regarding prehospital care among participants. These results

underlined the importance of formal and informal prehospital care education for nurses in Indonesia. Nurses working on ambulance might already have the knowledge and skills in prehospital care, but they may lack confidence which can be achieved with longer working experience on ambulances.

Enhancing the competency of health workers is part of the “health practitioners” domain as well as one of the strategic responses of the “health system” domain in the framework (World Health Organisation, 2007). It shows that to improve health services, standardised education and clinical practice are essential. Studies One and Two of this research emphasised that education played an important role in expanding the scope of practice among nurses in prehospital care in Indonesia. Creating a new profession in the prehospital setting, such as paramedics, might not be achievable for Indonesia in the current situation, so expanding the scope of practice among nurses in prehospital care is more effective. It is suggested that nurse-led ambulance services are the most feasible option for Indonesia, similar to Sweden (Sjölin, Lindström, Hult, Ringsted, & Kurland, 2015). However, expanding the scope of nursing practice in Indonesia cannot guarantee better prehospital care. This is because nurses are part of the bigger EMS system as a human resource element. There are several factors that need to be addressed to improve the EMS system in Indonesia. Study Three investigated the problems with implementing an EMS system in Indonesia and suggested several solutions to improve the system. The results of this study are discussed in the following section.

6.3 Improving EMS System in Indonesia

Study Three of this research investigated problems with implementing an EMS system in Indonesia and explored possible solutions. The “individuals, families, and communities”, “healthcare organisations” and “health system” domains of the WHO framework support this study. The strategic responses of the “individuals, families, and communities” domains include increasing health literacy and improving capacity for self-management and self-care. Study Three of this

research shows that community has important roles in establishing a well-organised EMS system. Community awareness is one of factors needed to be addressed to improve the EMS system in Indonesia. The WHO framework shows that community and mass media education campaigns are needed to increase health literacy among society. The results of this study also show that the Indonesian community should be educated in the importance and benefits of healthy lifestyle. This includes community education to increase awareness of the importance of EMS system and to reduce the EMS call centre misuse.

The “healthcare organisations” domain has several strategic responses, including ensuring effective and efficient coordination of care (World Health Organisation, 2007). However, this study revealed that most prehospital care in Indonesia lacked coordination both in the national and local government, hospital level, and community level. It is suggested that each area in Indonesia should implement the 119 EMS system with government support, especially local government. As the development of the EMS system depends more on local government where funding is usually limited, the national government should involve the private sectors to develop the system (Sharma & Brandler, 2014) and encourage support from developed countries, as experienced by Pakistan (Waseem, Naseer, & Razzak, 2011), Sri Lanka (Hesser, 2008), and India (Patrick, 2002). Enhancing the capacity of ambulance nurses may help foster a multidisciplinary team in the prehospital setting, which is one of the strategic responses of the “healthcare organisations” domain. The results of this study also suggested that empowering the community was another solution to improve the EMS system. This result was associated with another strategic response of the domain, which was strengthening patient education and family involvement in the health service.

One of the strategic responses of the “health system” domain of the WHO “People-Centred Healthcare” framework is developing guidelines for health services. In Indonesia, the SPGDT contains the national guidelines for prehospital emergency care launched in May 2016 by the Ministry of

Health (Kementerian Kesehatan Republik Indonesia, 2016a). These guidelines regulate prehospital care with the establishment of the NCC at the national level in Jakarta, and PSCs at the local/regional level. There are no published data about the current implementation of the system, although the goal is for the system to be implemented in all areas of Indonesia within two years of its launch.

The results of this research emphasise the importance of government policy in prehospital care. This is because the current health system in Indonesia is under challenge and prehospital system is still developing. The policy direction of prehospital care is somewhat unclear. It can be seen from the fact that the 119 EMS system is yet to be implemented in all area of Indonesia and most ambulance services are hospital-based and lacking a system for network response. The local government has an important role in policy establishment for an organized prehospital system in their area.

Another policy implication is related to nursing education. Nurses involved in this study feel inadequately prepared as ambulance nurses. An evaluation of the nursing curriculum in Indonesia is important to investigate the requirements for prehospital content within curricula. The nursing curriculum in Indonesia is organised by Nursing Collegiums of Indonesia in collaboration with Nursing Board of Indonesia and the Association of Indonesian Nurse Education Centre. The most recent amendment of the national undergraduate nursing curriculum was in 2015. The next amendment should consider prehospital care content within its curriculum. An alternative is creating a new profession, a professional paramedic which would have a significantly longer lead time to graduates prepared for entry to the workforce.

6.4 Limitations

The review of the healthcare system in Indonesia, including the financing for health, the health workforce, and the healthcare system in Malang, was limited due to a lack of published data on the topics of interest. Most published data consisted of government reports. The review of the EMS systems in LMICs was also limited due to a lack of up-to-date documented evidence for the development of these systems in LMICs.

This research consisted of three studies, each of which had its own limitations. Study One investigated the work readiness to be an ambulance nurse among Bachelor of Nursing graduates. However, diploma-qualified nurses constituted the majority of nurses currently working in Indonesia. The reason Bachelor of Nursing graduates were invited to participate was because a bachelor's degree will be the minimum qualification for nurses in the future. Also, the response terms include "very inadequately" to "very adequately" and it is acknowledged that they are subjective concepts and may not be very good terms especially when other options are "inadequately" and "adequately" which may create a flaw of this study. Study Two had an imbalanced proportion of *puskesmas* and hospital-based ambulance nurses, caused by geographical and infrastructure differences among the areas involved in the study. The level of competence among ambulance nurses could not be measured in Study Two and the study measured perceived knowledge, attitudes, and practice regarding prehospital care. Involving only hospital-based ambulance services in urban areas was a limitation of Study Three. The ambulance services from hospitals may differ from *puskesmas*-based ambulance services, and the services between urban and rural areas may also differ. Also, the small sample size of Study Three may influence the generalisation of the results.

Based on these limitations, the results of Study One may not represent all nursing graduates in Indonesia. The imbalanced proportion of participants in Study Two may not represent the perceived

competence of ambulance nurses in Malang, but the data did reveal more information about *puskesmas*-based ambulance nurses' competencies in prehospital care as opposed to hospital-based ambulance nurses. On the other hand, even though the study did not involve rural areas, Study Three may represent the current situation of prehospital care in Indonesia in terms of problems and solutions in implementing an EMS system. This is because all six cities involved in the study had implemented the previous 118 EAS system, while this was not done in any rural areas.

6.5 Chapter Summary

In order to improve healthcare quality, the WHO framework emphasises the importance of competent health practitioners. However, both nursing students and ambulance nurses who participated in this study had limited knowledge, skills, and practice regarding prehospital care. Both nursing students and ambulance nurses are in need of prehospital-related coursework and training. As nursing students already have basic knowledge and skills in providing care to the patients, specific prehospital knowledge and skill can be achieved by providing an in-house short course for nurses willing to work as ambulance nurses. *Puskesmas*-based ambulance nurses may need to be emphasised in prehospital education since *puskesmas*-based ambulance services are more accessible by the community. This is because *puskesmas*-based ambulances are more available than hospital-based ambulances, and there are more *puskesmas* than hospitals, especially in rural areas. Therefore, improving *puskesmas*-based ambulance services would be beneficial for prehospital care in Indonesia. In addition, the findings of this research showed a need for a national standard covering prehospital human resources both in education and clinical practice. The WHO framework also highlights the importance of well-organised and managed healthcare delivery. This research showed that prehospital care in Indonesia was underdeveloped. The national guidelines for the 119 EMS system needs to be implemented in all areas to improve prehospital care throughout the country. There is also a need for further guidelines on prehospital care, especially a standard related

to ambulance vehicles, human resources, and clinical practice. Based on the WHO framework, the policies regarding organisation, delivery, and financing of healthcare, in this case prehospital care, are essential to improve quality of care.

Chapter 7 Conclusion

7.1 The Summation

Prehospital care is an essential part of healthcare services, and a well-organised EMS system can reduce mortality rates among prehospital patients. The aim of this research was to identify the current status of prehospital care in Indonesia, its policy, operational and workforce challenges and the barriers to its development and to make recommendations for improvement. The three objectives of this study were (1) to identify if nursing graduates are work ready to be ambulance nurses, (2) to describe the perceived competence level of ambulance nurses in the prehospital setting, and (3) to outline decision makers' perspectives of the barriers and solutions associated with implementing an EMS system in Indonesia. In order to meet each objective, separate studies were designed.

This research approached the human resources topic in two studies, which investigated the work readiness of nursing graduates to become ambulance nurses and the perceived knowledge, attitudes, and practice of ambulance nurses regarding prehospital care. The following outlines how the study aim and objectives were met;

Study One was the first of its kind in Indonesia. It was undertaken to investigate whether nursing graduates were work ready to become ambulance nurses. This study is important because specific prehospital providers, such as paramedics, have not been recognised in Indonesia and nurses are responsible for staffing ambulance services. The nursing curriculum in Indonesia has limited prehospital care specific content. This study revealed that nursing graduates in Indonesia lacked prehospital-related practical skills. The "practical skills" domain of the questionnaire investigating work readiness to be an ambulance nurse was the lowest out of the eight domains. Therefore, it is recommended that practical skills related to prehospital care should be added to the national

nursing curriculum to prepare nursing students for work in ambulance services. Postgraduate education in emergency nursing should also be encouraged in the country. Two nursing institutions in Indonesia provide Master of Nursing course with an emergency nursing specialty stream; therefore, it is suggested that the number of programs may be expanded to meet demand. In a short period of time, in order to enhance the capacity of ambulance nurses, an in-house short course in prehospital care might be beneficial for nurses willing to work as ambulance nurses, as well as for current ambulance nurses.

Study Two investigated perceived knowledge, attitudes, and practice of ambulance nurses regarding prehospital care and was also the first of its kind in Indonesia. This study was undertaken to explore the perceived competence of ambulance nurses in a prehospital setting. The findings demonstrated that knowledge of prehospital care among ambulance nurses was limited. The study also revealed that emergency-related training had a significant contribution to knowledge, attitudes, and practice in prehospital care. The results of Study Two supported those of Study One, which showed that the quality of prehospital care human resources in Indonesia needed to be improved. Thus, formal and informal prehospital educations are crucial for nursing students and ambulance nurses in Indonesia. The second part of this research focused on the prehospital care system which explored problems and solutions in implementing the EMS system in Indonesia. Study Three was mostly undertaken in Malang, East Java, but also involved five other cities in Indonesia. This study was also the first such study of its kind in Indonesia. It outlined the perspectives of prehospital care decision makers regarding the barriers and solutions to implementing an EMS system. This study was significant as it explored the reasons for the end of the previous 118 EAS system and investigated solutions to overcome the problems. The results demonstrated that several factors influenced the status of the prehospital system in Indonesia, including government support, human resources in prehospital care, ambulance vehicles, and traffic. Local creativity and support from local government were essential to improve the EMS system. The national regulation on prehospital care (SPGDT) released

in May 2016 required each area in Indonesia to implement the current 119 EMS system within two years. However, the ability of local government and its health infrastructure and facilities to implement the system remains in question. Due to the geography and large population of the country, its infrastructure, facilities, and human resources vary greatly from region to region, leading to an uneven distribution of resources and funding, which could cause difficulties when implementing the EMS system. It is suggested that in areas where the 119 EMS system is yet to be implemented, an innovative, accessible and affordable approach to prehospital care is recommended. A community-based approach is suggested to improve the EMS system in Indonesia. A lesson can be learnt from the effectiveness of the Village Health Workers in Vietnam for providing initial prehospital care. The system might be applied in Indonesia in the area where the current 119 EMS system is yet to be implemented. A local initiative, such as creating a network of hospital-based ambulance services in the same area, may enhance the prehospital services. This is likely to be successful as it less costly and requires less infrastructure and resources. *Puskesmas* can be empowered as a first responder service for prehospital cases. However, this local initiative for prehospital care system needs support from the local government.

7.2 Implications

7.2.1 Implication for practice

With only a few areas currently implementing the 119 EMS system, local government should increase capacity to put the system into service. The results of this study could be used to help in this regard, such as by using local creativity to fund ambulance services, empowering the local community by providing first aid training for special groups of community i.e. security guards and taxi drivers, and increasing the competence of prehospital care providers. The competence in

prehospital care among ambulance nurses should be enhanced, especially for *puskesmas*-based ambulance nurses. It can be achieved by providing prehospital care training. National regulations about clinical practice in prehospital care are important including the use of drugs and medical equipment commonly used in the prehospital setting. Further policies regarding prehospital care are essential, especially regulations that standardise ambulance vehicles and crew.

7.2.2 Implications for education

Content addressing prehospital care should be added to the national undergraduate nursing curriculum. Prehospital care content should be added both in academic and clinical stages of the curriculum. In addition, informal training and courses are beneficial for nurses staffing ambulances at *puskesmas* and hospitals to enhance their competencies in prehospital care. National regulations on prehospital education are essential.

7.2.3 Implications for research

Future studies could explore work readiness to be an ambulance nurse among all levels of nursing graduates and employ a qualitative approach. Since *puskesmas*- and hospital-based ambulance nurses have different work cultures, future studies could focus on each of these groups separately and increase the current understanding of prehospital human resources in Indonesia. To gather more comprehensive data on barriers and solutions when implementing the new EMS system in Indonesia, it would be useful to involve rural areas. Qualitative study investigating the preparation of nursing workforce to deliver ambulance service is essential to have a comprehensive overview of prehospital care provider in Indonesia.

Following prehospital care training for ambulance nurses, it would be beneficial to investigate the difference in patient outcomes when cared for by trained staff versus staff without prehospital care training. The study would evaluate whether there is an association between qualifications and

experience of prehospital ambulance nurses and patient outcomes. Further, it would be beneficial to investigate the required prehospital-related skills among nurses, a quantitative study investigating ambulance patient injury and illness profiles and typical treatments required for those patients.

7.3 Recommendations

Based on the results of this research it recommended that educational, practical, and governmental actions should be undertaken. An evaluation of nursing curricula to assess the needs of prehospital content is recommended to establish graduate competencies in prehospital care. To enhance the capacity of ambulance nurses in providing prehospital care, a short course in ambulance nursing and postgraduate certificate as alternatives are suggested. The implementation of the 119 EMS system requires a strong commitment among stakeholders including national and local government, hospitals, *puskesmas*, health department, and community. This implementation needs their support for a prepared ambulance nurse workforce. Further, in the area where the 119 EMS is yet to be implemented, a local initiative in establishing an innovative, accessible and affordable local prehospital care service is suggested. These types of initiatives can be as both hospital network-based ambulance service and community-based approaches to prehospital care, and could employ the health volunteer and empower the *puskesmas* as the first responder.

7.4 Conclusion

The results of the research have added to the overall knowledge of prehospital care in Malang, East Java, and to some extent, Indonesia more broadly, both in terms of human resources and the prehospital care system. The findings may also be used to improve education and clinical practice for prehospital care and emergency care services in Indonesia and ultimately improve the health status.

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Appendices

Appendix A

Human Ethics Certificate of Approval from Monash University Human Research Ethics Committee (MUHREC)



Monash University Human Research Ethics Committee (MUHREC)
Research Office

Human Ethics Certificate of Approval

This is to certify that the project below was considered by the Monash University Human Research Ethics Committee. The Committee was satisfied that the proposal meets the requirements of the *National Statement on Ethical Conduct in Human Research* and has granted approval.

Project Number: CF14/3742 - 2014001963
Project Title: Exploring Prehospital Care in Indonesia
Chief Investigator: Assoc Prof Virginia Plummer
Approved: **From:** 3 December 2014 **To:** 3 December 2019

Terms of approval - Failure to comply with the terms below is in breach of your approval and the Australian Code for the Responsible Conduct of Research.

1. The Chief investigator is responsible for ensuring that permission letters are obtained, if relevant, before any data collection can occur at the specified organisation.
2. Approval is only valid whilst you hold a position at Monash University.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by MUHREC.
4. You should notify MUHREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. The Explanatory Statement must be on Monash University letterhead and the Monash University complaints clause must include your project number.
6. **Amendments to the approved project (including changes in personnel):** Require the submission of a Request for Amendment form to MUHREC and must not begin without written approval from MUHREC. Substantial variations may require a new application.
7. **Future correspondence:** Please quote the project number and project title above in any further correspondence.
8. **Annual reports:** Continued approval of this project is dependent on the submission of an Annual Report. This is determined by the date of your letter of approval.
9. **Final report:** A Final Report should be provided at the conclusion of the project. MUHREC should be notified if the project is discontinued before the expected date of completion.
10. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by MUHREC at any time.
11. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.



Professor Nip Thomson
Chair, MUHREC

cc: Dr Malcolm Boyle, Mr Suryanto Suryanto



Appendix B

Human Ethics Certificate of Approval from Health Research Ethics Committee of Ministry of Health of Indonesia



KEMENTERIAN KESEHATAN RI BADAN PENELITIAN DAN PENGEMBANGAN KESEHATAN

Jalan Percetakan Negara No. [REDACTED]

Telepon : [REDACTED]

Faksimile : [REDACTED]

Surat Elektronik : [REDACTED]

Laman (*Website*) : <http://www.litbang.depkes.go.id>

PERSETUJUAN ETIK (*ETHICAL APPROVAL*)

Nomor : LB.02.01/5.2/KE. 451 /2014

Yang bertanda tangan di bawah ini, Ketua Komisi Etik Penelitian Kesehatan Badan Litbang Kesehatan, setelah dilaksanakan pembahasan dan penilaian, dengan ini memutuskan protokol penelitian yang berjudul :

"Studi Eklorasi : Pelayanan Sebelum Rumah Sakit (Pre-Hospital Care) di Indonesia. "

yang mengikutsertakan manusia sebagai subyek penelitian, dengan Ketua Pelaksana / Peneliti Utama :

Ns. Suryanto, S.Kep., M.Nurs.

dapat disetujui pelaksanaannya. Persetujuan ini berlaku sejak tanggal ditetapkan sampai dengan batas waktu pelaksanaan penelitian seperti tertera dalam protokol dengan masa berlaku maksimum selama 1 (satu) tahun.

Selama penelitian berlangsung, laporan kemajuan (setelah 50% penelitian terlaksana) harus diserahkan kepada KEPK-BPPK. Pada akhir penelitian, laporan pelaksanaan penelitian harus diserahkan kepada KEPK-BPPK. Jika ada perubahan protokol dan / atau perpanjangan penelitian, harus mengajukan kembali permohonan kajian etik penelitian (amandemen protokol).

Jakarta, 1 Desember 2014

Ketua
Komisi Etik Penelitian Kesehatan
Badan Litbang Kesehatan,

[REDACTED]
Prof. Dr. M. Sudomo

Appendix C

Questionnaire for the study on Work Readiness to be an Ambulance Nurse among Nursing Graduates in Malang, Indonesia



Project Title:

Work readiness to be ambulance nurse among nursing graduates in Indonesia

Please complete the questionnaire. There are three sections, please read the instructions for every section.

A. Demographic Data

Instructions:

Please answer by circling OR crossing OR ticking the appropriate answers or write down your answer.

1. **Gender** : Male
Female

2. **Age** : (years)

3. Nursing Education Experience

- a. Are you graduated from Bachelor of Nursing regular program?

Yes No

- b. Are you graduated from Bachelor of Nursing transferred program?

Yes No

- c. Which institution was your Bachelor of Nursing degree granted from?

Brawijaya University

Muhammadiyah University

Maharani Health College

Widyagama Husada Health College

Kenedes Health College

Health College of Kepanjen

Tribhuwana Tungga Dewi University

Other, please specify



d. When did you graduate as Bachelor of Nursing?

Month:

Year:

January

2013

February

2014

March

April

May

June

July

August

September

October

November

December

e. If you are graduated from Bachelor of Nursing transferred program, which institution was your Diploma in Nursing degree granted from? *(leave it blanks if inappropriate)*

Health Polytechnic of Malang – Malang College

Health Polytechnic of Malang – Lawang College

Muhammadiyah University

Soepraoen Health Polytechnic

Kendedes Health College

Health College of Kepanjen

Panti Waluya Health College

Other, please specify

f. When were you granted as Diploma of Nursing graduate?

..... *(Please write the year)*



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g. Do you have a degree from Vocational School of Nursing?

Yes No

h. If you are graduated from Vocational School of Nursing program, which institution was your Vocational School of Nursing degree granted from? *(leave it blanks if inappropriate)*

Celaket Vocational School of Nursing

Lawang Vocational School of Nursing

Kepanjen Vocational School of Nursing

Soepraoen Vocational School of Nursing

Panti Waluya Vocational School of Nursing

Other, please specify

i. When did you graduate from Vocational School of Nursing? *(leave it blanks if inappropriate)*

..... *(Please write the year)*

j. Length of nursing education in total *(years)*

4. Work experience

a. Do you have any work experience as a nurse?

Yes No

b. If you have a work experience, length of your work experience as a nurse: *(years)*

c. If you have a work experience, did you work at emergency department (ED)?

Yes No

d. If you have a work experience at ED, length of your work experience as an emergency nurse: *(years)*



5. Training records

Have you have had the following training?

a. Basic Cardiac Life Support/Basic Life Support (BLS/BCLS)

Yes No

If "YES", is the certification Valid Expired

b. Advanced Cardiac Life Support (ACLS)

Yes No

If "YES", is the certification Valid Expired

c. Basic Trauma Life Support (BTLS)

Yes No

If "YES", is the certification Valid Expired

d. Advanced Trauma Life Support (ATLS)

Yes No

If "YES", is the certification Valid Expired

e. Basic Emergency Ambulance Protocol

Yes No

If "YES", is the certification Valid Expired

f. Triage Officer Course

Yes No

If "YES", is the certification Valid Expired

g. Trauma Nursing Care

Yes No

If "YES", is the certification Valid Expired



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h. ECG and Resuscitation Course

Yes No

If "YES", is the certification Valid Expired

i. General Emergency Life Support (GELS)

Yes No

If "YES", is the certification Valid Expired

j. Others, please specify



B. Questionnaire

1. Work Readiness

Instruction:

The following statements will ask your work readiness to be an ambulance nurses. Please choose one response from the six (6) possible responses by ticking or circling or crossing the relevant response.

General statement for each item is:

At this point, I feel prepared to

No.	Statements	VERY INADEQUATELY	INADEQUATELY	SOMEWHAT INADEQUATELY	SOMEWHAT ADEQUATELY	ADEQUATELY	VERY ADEQUATELY
1	Recall my knowledge of anatomy	1	2	3	4	5	6
2	Perform basic life support techniques	1	2	3	4	5	6
3	Communicate with patients from different cultural backgrounds	1	2	3	4	5	6
4	Load and unload a stretcher from the back of an ambulance	1	2	3	4	5	6
5	Conduct an accurate, concise and clear handover	1	2	3	4	5	6
6	Manage my time	1	2	3	4	5	6
7	Continually evaluate my own performance	1	2	3	4	5	6
8	Manage a high acuity patient at a scene	1	2	3	4	5	6
9	Take a history from a patient	1	2	3	4	5	6
10	Formulate a nursing diagnosis	1	2	3	4	5	6
11	Cope with stress of my work	1	2	3	4	5	6
12	Invest time in developing skills	1	2	3	4	5	6
13	Communicate with other emergency service workers	1	2	3	4	5	6
14	Balance my work and personal life	1	2	3	4	5	6
15	Work collaboratively with other ambulance nurse colleagues	1	2	3	4	5	6
16	Assemble the oxygen equipment inclusive of changing the oxygen cylinders	1	2	3	4	5	6



17	Communicate with elderly patients	1	2	3	4	5	6
18	Apply my knowledge of pathophysiology	1	2	3	4	5	6
19	Undertake a daily check of the hemodynamic monitor/defibrillator	1	2	3	4	5	6
20	Complete incident report as required	1	2	3	4	5	6
21	Administer a drug (i.e., intramuscularly, intravenously, intranasally)	1	2	3	4	5	6
22	Perform chest compression	1	2	3	4	5	6
23	Drive the ambulance safely in emergency situations	1	2	3	4	5	6
24	Use my knowledge of pharmacology/drug properties	1	2	3	4	5	6
25	Keep up to date with technology	1	2	3	4	5	6
26	Communicate with other health care professionals	1	2	3	4	5	6
27	Apply wound dressing when necessary	1	2	3	4	5	6
28	Readily access equipment in the ambulance vehicle and restock properly	1	2	3	4	5	6
29	Use my knowledge of microbiology	1	2	3	4	5	6
30	Undertake an assessment of a patient	1	2	3	4	5	6
31	Understand my legal responsibilities to patients	1	2	3	4	5	6
32	Use de-escalation strategies in dealing with agitated patients	1	2	3	4	5	6
33	Remain calm in difficult situations	1	2	3	4	5	6
34	Communicate effectively with bystanders	1	2	3	4	5	6
35	Participate in professional association activities (i.e., with Indonesian National Nurses Association)	1	2	3	4	5	6
36	Discuss stressful experiences with colleagues	1	2	3	4	5	6
37	Act in ethical way towards colleagues	1	2	3	4	5	6
38	Communicate with relatives and bystanders in the event of patient	1	2	3	4	5	6



	becoming deceased or cessation or resuscitation						
39	Perform spinal packaging (i.e., use cervical collar, spine board)	1	2	3	4	5	6
40	Complete an accurate patient care record using standard procedures	1	2	3	4	5	6
41	Perform fluid resuscitation in accordance with approved procedures	1	2	3	4	5	6
42	Communicate with patients from low socioeconomic groups	1	2	3	4	5	6
43	Use ambulance communication system	1	2	3	4	5	6
44	Follow Clinical Practice Guidelines	1	2	3	4	5	6
45	Communicate effectively with suicidal patients	1	2	3	4	5	6
46	Carry out a vehicle check	1	2	3	4	5	6
47	Achieve musculoskeletal immobilization	1	2	3	4	5	6
48	Prime a giving set	1	2	3	4	5	6
49	Apply my knowledge of human physiology	1	2	3	4	5	6
50	Use an hemodynamic cardiac monitor/defibrillator for recording ECG	1	2	3	4	5	6
51	Be culturally sensitive in my interactions with patients	1	2	3	4	5	6
52	Understand my legal responsibilities to peers	1	2	3	4	5	6
53	Read and interpret ECG traces	1	2	3	4	5	6
54	Engage in individual patient health education	1	2	3	4	5	6
55	Effectively manage the impact of shift work on my sleep and health	1	2	3	4	5	6
56	Maintain my clinical skills	1	2	3	4	5	6
57	Act in ethical way towards patients	1	2	3	4	5	6
58	Be actively involved in the clinical guidelines review process (i.e., with Indonesian National Nurses Association)	1	2	3	4	5	6
59	Actively participate in formal debriefing	1	2	3	4	5	6
60	Communicate effectively with mentally ill patients	1	2	3	4	5	6



61	Apply my knowledge of organizational policies	1	2	3	4	5	6
62	Communicate with patients under the influence of drugs and alcohol	1	2	3	4	5	6
63	Actively participate in the development of paramedics as a profession	1	2	3	4	5	6
64	Access and engage in peer support	1	2	3	4	5	6

2. Extended Answer Questions

Instruction:

Please answer the following questions based on your experience during your Bachelor of Nursing course.

- a. Do you consider that you were prepared for becoming an ambulance nurse during your Bachelor of Nursing course?

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.....

- b. In terms of preparing you for work as an ambulance nurse, what were the best aspects of your course?

.....
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.....



c. In terms of preparing you for work as an ambulance nurse, what aspects of your nursing course could be improved?

.....
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.....

d. How useful were the emergency department placements during your course in preparing you to be an ambulance nurse?

.....
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.....

e. If you have other previous nursing education, whether Diploma of Nursing course or Vocational of Nursing course, how was the comparison in regard to preparing oneself to be an ambulance nurse between your Bachelor of Nursing course and your previous nursing education? *(leave it blanks if inappropriate)*

.....
.....
.....
.....
.....
.....
.....

Thank you very much for participating in the study.

This questionnaire is adopted from previous study by O'Brien, et.al. (2013)*.

* O'Brien, K., Moore, A., Hartley, P., & Dawson, D. (2013). Lessons about work readiness from final year paramedic students in an Australian university. *Australasian Journal of Paramedicine*, 10(4).

Indonesian version of the questionnaire is available from the researcher.

Appendix D

Questionnaire for the study on Knowledge, Attitudes, and Practice of Ambulance Nurses in Prehospital Care in Malang, Indonesia

MONASH University



Project Title:

**Knowledge, Attitudes, and Practice of Ambulance Nurses
Regarding Prehospital Care**

Instructions:

Please complete the questionnaire. There are four sections, please read the instructions for every section. Please indicate the extent of your **agreement** or **disagreement** with each of the following statements by circling or crossing the appropriate number.

Example: (1) or ~~X~~

(1) or X

A. Demographic Data

1. **Gender** : [1] Male
 [2] Female

2. **Age** : (years)

3. **Highest Level of Education**

- [1] Vocational School of Nursing
- [2] Diploma in Nursing (Diploma III)
- [3] Diploma IV in Nursing
- [4] Bachelor Science in Nursing
- [5] Master in Nursing
- [6] Specialist Nurse, please specify:
- [7] PhD/Doctorate
- [8] Others, please specify:



- 4. Length of experience as a qualified nurse: (years)
- 5. Length of experience as an ambulance nurse: (years)
- 6. Training records

Have you have had the following training?

a. Basic Cardiac Life Support/Basic Life Support (BLS/BCLS)

Yes No

If "YES", is the certification Valid Expired

b. Advanced Cardiac Life Support (ACLS)

Yes No

If "YES", is the certification Valid Expired

c. Basic Trauma Life Support (BTLS)

Yes No

If "YES", is the certification Valid Expired

d. Advanced Trauma Life Support (ATLS)

Yes No

If "YES", is the certification Valid Expired

e. Basic Emergency Ambulance Protocol

Yes No

If "YES", is the certification Valid Expired

f. Triage Officer Course

Yes No

If "YES", is the certification Valid Expired

g. Trauma Nursing Care

Yes No

If "YES", is the certification Valid Expired



h. ECG and Resuscitation Course

Yes No

If "YES", is the certification Valid Expired

i. General Emergency Life Support (GELS)

Yes No

If "YES", is the certification Valid Expired

j. Others, please specify



B. Questionnaire

1. KNOWLEDGE

Instruction:

The following statements will ask your knowledge about prehospital care. Please indicate the extent of your knowledge with each of the following statements by circling or crossing the appropriate number.

No.	Statements	VERY POOR	POOR	GOOD	VERY GOOD
1	Studied pre-hospital care during nursing school	1	2	3	4
2	Studied pre-hospital care after the completion of my nursing education	1	2	3	4
3	Knowledge about Basic Life Support (BLS)	1	2	3	4
4	Knowledge about Advanced Life Support (ALS)	1	2	3	4
5	Knowledge about Cardio-Pulmonary Resuscitation (CPR)	1	2	3	4
6	Knowledge about Revised Trauma Score (RTS) for prognosis on trauma/injured patients	1	2	3	4
7	Knowledge about care during prehospital transportation	1	2	3	4
8	Knowledge about the equipment ambulances carry	1	2	3	4
9	Knowledge about managing an emergency prehospital patient	1	2	3	4
10	Knowledge about the care of a patient with a suspected/actual Myocardial Infarction	1	2	3	4
11	Knowledge about the care of a patient with suspected/actual head trauma	1	2	3	4



12	Knowledge about the care of a patient with suspected/actual musculoskeletal injury	1	2	3	4
13	Knowledge about the care of a patient with suspected/actual spinal injury	1	2	3	4



2. ATTITUDE

Instruction:

The following statements will ask your attitude about prehospital care. Please indicate the extent of your agreement or disagreement with each of the following statements by circling or crossing the appropriate number.

No.	Statements	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE
1	Trained ambulance personnel should accompany the ambulance to the site of a trauma/emergency	1	2	3	4
2	There should be mandatory legislation for formal training and skill transfer in prehospital care for ambulance nurses	1	2	3	4
3	There should be mandatory legislation for formal training and skill transfer in prehospital care for police personnel and firefighters	1	2	3	4
4	There should be mandatory legislation for formal training and skill transfer in prehospital care for security staff and public transport drivers	1	2	3	4
5	CATS (Centralized Accident and Trauma Services) or central ambulance service with BLS provider would decrease patient mortality/morbidity in your city	1	2	3	4
6	Nurse graduates in Indonesia should have mandatory training in Basic Life Support/Basic Cardiac Life Support (BLS/BCLS)	1	2	3	4



7	Nurse graduates in Indonesia should have mandatory training in Advanced Cardiac Life Support (ACLS)	1	2	3	4
8	Nurse graduates in Indonesia should have mandatory training in Basic Trauma Life Support (BTLS)	1	2	3	4
9	Nurse graduates in Indonesia should have mandatory training in Advanced Trauma Life Support (ATLS)	1	2	3	4
10	Nurse graduates in Indonesia should have mandatory training in Basic Emergency Ambulance Protocol	1	2	3	4
11	Nurse graduates in Indonesia should have mandatory training in Triage Officer Course	1	2	3	4
12	Nurse graduates in Indonesia should have mandatory training in Trauma Nursing Care (TNC)	1	2	3	4
13	Nurse graduates in Indonesia should have mandatory training in ECG and Resuscitation Course	1	2	3	4
14	Nurse graduates in Indonesia should have mandatory training in General Emergency Life Support (GELS)	1	2	3	4
15	The government should take up prehospital care as one of their priority agendas	1	2	3	4
16	Health care providers should take up prehospital care as their priority agenda	1	2	3	4



17	I am ready to join/form a society or an organization providing prehospital care and transportation to the site of an emergency	1	2	3	4
18	There should be a free general emergency call provided in Indonesia	1	2	3	4
19	Communication call centers manned by prehospital care providers at every 50 kms should be established along national highways	1	2	3	4
20	Indonesia should have special health care providers as first responders providing prehospital care (as paramedics in Australia or Emergency Medical Technicians/EMT in United States America)	1	2	3	4



3. PRACTICE

Instruction:

The following statements will ask your practice as ambulance nurse about prehospital care. Please indicate the extent of your agreement or disagreement with each of the following statements by circling or crossing the appropriate number.

No.	Statements	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE
1	I provide adequate BLS to patients who are transported to hospital by ambulance	1	2	3	4
2	I provide good quality Cardio-Pulmonary Resuscitation (CPR) to patients	1	2	3	4
3	I attended regular courses/seminars on prehospital care management/emergency	1	2	3	4
4	I deliver a systematic ABCDE in the care of emergency patient confidently	1	2	3	4
5	I use protocols and algorithms when managing trauma/emergency patients in prehospital setting	1	2	3	4
6	My basic life saving equipment (Ambu Bag, mouth to mouth airway) is always ready	1	2	3	4
7	There is mismanagement in regard to prehospital care in my hospital/public health center	1	2	3	4
8	I respond confidently when present on an accident site	1	2	3	4

This questionnaire is adopted from previous study by Kumar, et.al. (2008)*.

*Kumar, S., Agarwal, A. K., Kumar, A., Agrawal, G. G., Chaudhary, S., & Dwivedi, V. (2008). A study of knowledge, attitude and practice of hospital consultants, resident doctors and private practitioners with regard to pre-hospital and emergency care in Lucknow. *Indian Journal of Surgery*, 70(1), 14-18.

Indonesian version of the questionnaire is available from the researcher.

Appendix E

List of questions for the study on Barriers and Solutions of Implementing an EMS System in Indonesia



List of Questions for Structured Interview

Barriers and solutions to implementing an EMS system in Indonesia

1. General questions regarding the previous EMS system
 - a. When did your area have an EMS system? For how long?
 - b. Who were involved in organizing the EMS system?
 - c. Where the funding come from?
 - d. How was the implementation of the EMS system in that time?
 - e. What kinds of services were offered to the community regarding EMS system? Was there any free call centre? Was there any dispatcher? Was it centred in one hospital or involved with more than one hospital?
 - f. Who has been involved – hospitals, police department, fire department?
 - g. How is the current EMS system applied in your area, if there is one?
2. Care in the community
 - a. What are the obstacles regarding providing care in the community when applying EMS system?
 - b. Was it easy for the community to access the call centre?
 - c. Was it easy for health care providers to be at the emergency scene?
 - d. How can these obstacles be solved?
 - e. How is the quality of the current EMS system regarding care in the community?
3. Care during transportation
 - a. What are the obstacles regarding providing care during transport when applying EMS system?
 - b. How was the distribution of the health facilities? Was it influence the care?
 - c. How was the vehicle used for patient transport? Was it appropriate – quality and quantity?
 - d. How was the road condition? Was it an influence on the care?
 - e. Who paid for the transport? How much was the rate? If the patient must pay for the transport, was it affordable?
 - f. Describe the quality of care provided by health care provider during transport?
 - g. What were the qualifications of health care providers who could be first responders? Was there any training to be an ambulance officer?
 - h. What could health care providers do for patient care? Was there any limitation of authority for health care providers during transport?
 - i. Were the facilities of the ambulance good enough to provide high quality of care?
 - j. How can these obstacles be solved?
 - k. How is the current EMS system regarding care during transportation?



4. Care on arrival at the receiving health facility
 - a. What are the obstacles regarding providing care on arrival when applying EMS system?
 - b. Who were health workers who standby in the emergency department? Were there any emergency medicine specialist, physicians, nurses, social workers? What were their qualifications?
 - c. How was the quality of health workers in emergency department? Were they well-qualified?
 - d. How was the quantity of health workers in emergency department? Was the amount enough?
 - e. Was there any training for health workers in emergency department? What kind of training was that? Who did the training?
 - f. How was the medication for patients who come to emergency department? Was it good enough?
 - g. How was the equipment at emergency department? Was it good enough?
 - h. How was the management of the patient who are admitted to emergency department? Was there any standard operating procedure in regard admitting patient? Was there any mechanism for the triage of patients?
 - i. How these obstacles can be solved?
 - j. How is current EMS system regarding care on arrival at the receiving health facility?

The questions are based on previous study by Levine et al. (2007)*.

* Levine, A. C., Presser, D. Z., Rosborough, S., Ghebreyesus, T. A., & Davis, M. A. (2007). Understanding Barriers to Emergency Care in Low-Income Countries: View from the Front Line. *Prehospital and Disaster Medicine*, 22(5), 467-470.