Emergency Services Utilization in Jakarta (Indonesia): A Cross-Sectional Study of Patients Attending Hospital Emergency Departments

Syaribah Noor Brice (BriceSN@cardiff.ac.uk)
Cardiff University

Justin James Boutilier
University of Wisconsin–Madison

Daniel Gartner
Cardiff University

Paul Harper
Cardiff University

Vincent Knight
Cardiff University

Jen Lloyd
Welsh Ambulance Services NHS Trust

Aryono Djuned Pusponegoro
118 Emergency Ambulance Service Foundation

Asti Puspita Rini
118 Emergency Ambulance Service Foundation

Jonathan Turnbull-Ross
Welsh Ambulance Services NHS Trust

Mark Tuson
Cardiff University

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Abstract

Background

Pre-hospital and emergency services in Indonesia are still developing. Despite recent improvements in the Indonesian healthcare system, issues with the provision of pre-hospital and emergency services persist. The demand for pre-hospital and emergency services has not been the subject of previous research and, therefore, has not been fully understood. Our research explored the characteristics of patients attending hospital emergency departments in Jakarta, Indonesia.

Methods

The study used a cross-sectional survey design involving five general hospitals (four government-funded and one private). The patients' demographic profile, medical conditions, time to treatment based on different medical conditions, and methods of transport to reach the hospitals were analysed using descriptive statistics. The Kruskal-Wallis test was used to compare groups and the result was considered significant if the p-value < 0.05.

Results

A total of 1,964 patients was surveyed. The median age of patients was 44 years with an interquartile range (IQR) of 26 to 58 years. IQR describes the range of the middle 50% of values in the data when it is ordered from lowest to highest. Life-threatening conditions such as trauma and cardiovascular diseases were found in 8.6% and 6.6% of patients respectively, the general medical category accounted for 63%. The majority of patients with trauma travelled to the hospital using a motorcycle or car (59.8%). Ambulance was used by 9.3% of the patients, 38% of patients were not aware of the availability of ambulances. The median travel time by ambulances to the hospital was 42 minutes (IQR: 12 to 54 minutes). The median time to treatment for patients with cardiovascular disease was 102 minutes (IQR: 66 to 300 minutes).

Conclusion

Investing resources in pre-hospital and emergency services in Indonesia and in particular the provision of ambulance services, would create real benefits for the population and result in a significant reduction in deaths following heart disease and stroke.

Background

The healthcare system in Indonesia is undergoing significant changes in many areas including emergency care, both for pre-hospital and in-hospital care settings[1]. The challenges facing pre-hospital care include a lack of ambulance vehicles, large geographical areas, political and economic uncertainty, a fatalistic culture, and low public awareness of the existing ambulance services and emergency care provision[2].

Up to 2019 there were 186 hospitals in Jakarta, serving more than 10.5 million people, of which 135 were general hospitals and 51 were specialist hospitals[3]. General hospitals with emergency units have ambulances. Across Jakarta, only 85 ambulances belong to the government[4]. These ambulances are mainly used for patient transportation between hospitals[5].

Approximately 13.86% of the population in Jakarta have significant health problems, with females and males accounting for 14.30% and 13.43% of these respectively[6]. However, only 22.16% of outpatient patients accessed the hospitals[6]. During 2019, 19.42% of total deaths in Indonesia were caused by stroke (compared to the UK and Low-Middle-Income countries 8.14% and 9.79% respectively)[7].

The provision of pre-hospital and emergency services in Low- or Middle-Income countries is characterised by inadequate resourcing both financially and in terms of staff[8]. Other issues include fragmented services, fragmented data collection strategies, and variation in quality and consistency of that data[9]. In general, inadequate infrastructure, culture on healthcare seeking behaviour, communication, and coordination represent barriers to emergency care services in these countries[10]. Better understanding of the demand would enable prioritisation of areas for improvement in the provision of pre-hospital and emergency services.

This study aimed to explore the characteristics of patients attending emergency departments in Jakarta. We provide descriptive statistics about the following data: socio-demographic profiles, medical conditions, transportation modes and reason to choose it leading to the arrival at the hospitals, and time difference between the onset of the emergency event and the treatment in the hospital. The objectives were to answer the following main questions: 1. What are the characteristics of patients attending a hospital emergency department in Jakarta? 2. How do the patients reach the hospital? 3. How do ambulances fare compared with other mode of transports? 4. What are the barriers in accessing the pre-hospital and emergency services in Jakarta?

The remainder of this paper is structured as follows. The methodology section describes the procedures in data collection. This is followed by a comprehensive analysis of the results broken down by different metrics and levels of detail. The discussion section highlights the findings from the survey, the suggestions made to overcome some barriers in accessing emergency services, and study limitations. The paper is concluded by highlighting the need for improving the organisation of the emergency services.

Methodology

Study design and setting

A survey was conducted in five major hospitals in Jakarta for one month, December 2019. These five comprised four government-funded and one private hospital. Two of the government hospitals accept nationwide referrals.

Study sample

Each patient who attended one of the hospital emergency departments during December 2019 was invited to take part in the study. A total of 1,964 patients agreed to participate.

Data

The questionnaire gathered information on the patients' demographic profile, medical conditions, and the timing of the events involved in the patients' journey to the emergency department. The questionnaire was adapted from Boutilier and Chan (2020)[11].

Journey time data was collected in the form of six 'time-stamps'; the time when the emergency happened, the patient call for the transport, transport arrival at the scene, patient departure to the hospital, patient arrival at the hospital, and when the patient received treatment for the first time.

Data collection and analysis

The data was collected by hospital staff. Each hospital was provided with a manual on data types, a list of standard medical codes, and a formatted excel spreadsheet, to record the data. Data cleaning and analysis were conducted using open-source software R version 3.6.3[12] (package tidyverse[13] and lubridate[14]).

Continuous data (such as age and duration) are presented using median values and IQR. Categorical data, such as types of transportation and gender, are presented using percentages and counts. The percentage figures are rounded to one decimal point. Comparisons between groups used the Kruskal-Wallis test and the result is considered significant if the p-value < 0.05.

Results

In this section, we report the results of our analysis following the research questions. The first question is answered by describing the patients' demographic characteristics and their medical conditions. The second question is answered by the analysis of the transportation modes and the patients' medical conditions versus the transportation modes used to go to the hospitals. The third question is answered by analysing the travel duration and time to treatment.

Demographic characteristics of patients

Of the 1,964 individuals whose data was collected, 1,051 (51.7%) were male and 949 (48.3%) were female. Table 1 in supplementary material provides a summary of the patients' socio-demographic profile.

Across the hospitals, the percentage of male and female patients ranged from 48–53% and 41–53% respectively. The median age for all patients was 44 years old (IQR: 26 to 58 years), 38.9% of patients obtained high school certificates as their highest education level.

The survey recorded six occupation types. The majority of patients were in the 'Other' category (50.3%) (not in employment or retired). This may be explained by around 50% of the partisipants were either under 26 years old or over 58 years old. The next most common level of occupation was "Employee" (26.3%). The results showed a similar pattern across the five hospitals.

The results on monthly household income show that 35.6% of people had between 1–3 million Indonesian Rupiah (IDR), equivalent to £55.46 – £166.37. Further investigation confirmed that most patients with no income were those of young age. Around 10% of patients did not state their income, i.e., "unknown". The majority were adults with median age of 59 years (IQR: 47 to 68 years).

Concerning marital status, we used the following categories: not married, married, and widow/widower. The majority of respondents (64%) were married, around 30% of these had 3 or more children.

Medical conditions

Table 2 presents the summary of the medical conditions by category and the corresponding age of patients. The majority of patients attending the emergency department had general medical problems (63%). Cardiovascular accounted for 6.6% of attendance, whilst respiratory and trauma were both just under 24%. The differences between median age of male and female patients in the cardiovascular and neurological categories are significant ($p < 0.05$).

Table 2
Summary of patient's age (years) by medical groups.

Medical Group	Total		Female		Male		Kruskal-Wallis test
	N (%)	Med (IQR)	N (%)	Med (IQR)	N (%)	Med (IQR)	p-value*
Medical	1236 (62.9)	41.5 (24,57)	637 (67.1)	41 (25,56)	599 (59.0)	42 (23,58)	0.6606
Respiratory	301 (15.3)	47 (30,59)	126 (13.3)	50 (29.2,59)	175 (17.2)	47 (31.5,59.2)	0.5683
Trauma	169 (8.6)	35 (23,51)	60 (6.3)	35.5 (22.5,55.2)	109 (10.7)	33 (24,48)	0.6585
Cardiovascular	130 (6.6)	55 (47,63)	50 (5.3)	57.5 (48.2,71.2)	80 (7.9)	54 (47,59.2)	0.0235
Neurological	72 (3.7)	59 (50.8,66.2)	37 (3.9)	63 (56,69)	35 (3.4)	55 (48,61.5)	0.0055
Other	56 (2.9)	29 (22,35.2)	39 (4.1)	29 (23,35)	17 (1.7)	29 (8,55)	0.9573
Total	1964 (100)	44 (26,58)	949 (100)	44 (26,58)	1015 (100)	44 (26,58)	0.5425

*The test was done for comparing males and females.

Transportation modes

Table 3 summarises the mode of transport used by the patients. The results show that 'Own Car' and 'Ride-sharing service car' categories were the most used transportation modes (30.3% and 30.4% respectively). Ambulances were used by 9.3% of patients. Around 19.7% of patients used motorcycles to reach hospitals. Public transport and taxi share similar proportions (3.3% and 3.1% respectively). The category "Other" (3.9%) includes CNG-fuelled three-wheeler vehicles.

Table 3
Summary of transport modes used by patients.

Transport Mode	Total N (%)	Female N (%)	Male N (%)
Own car	596 (30.3)	284 (29.9)	312 (30.7)
Ride-sharing service car	598 (30.4)	292 (30.8)	306 (30.1)
Public transport	65 (3.3)	29 3.1)	36 (3.5)
Ambulance	182 (9.3)	97 (10.2)	85 (8.4)
Motorcycle	387 (19.7)	179 (18.9)	208 (20.5)
Taxi	61 (3.1)	31 (3.3)	30 (3.0)
Other	75 (3.8)	37 (3.9)	38 (3.7)
Total	1964 (100)	949 (100)	1015 (100)

The reasons for choosing the different methods of transport are recorded in Table 4 in supplementary material.

The majority of patients who used an ambulance did so because of their medical conditions (50.3%). The next most common reason was because of medical advice (23.2%). Only 7.2% of patients who used the ambulance thought that it was affordable.

Many patients did not use the ambulance because they were not aware of the ambulance services (37.9%). A proportion of patients thought that it was not necessary to call the ambulance (20.8%), whereas others said that the ambulance took too long to arrive (17.7%). Some patients tried to contact an ambulance service, but it was not available (12.2%). Only 7.8% of patients who did not use an ambulance thought the ambulance was expensive. Maybe this was because many patients were not aware of the existence of an ambulance service.

More than 75% of patients did not know how to contact an ambulance. This included those patients who did and did not use an ambulance. Patients who did not know how to contact an ambulance but ended up using an ambulance might have received help from a carer or family member.

The travel costs spent by patients to reach the hospitals varied. The majority (80.7%) of patients reported that the transportation costs were less than £6. Just over 1% of patients spent more than £55 on transport.

Around 38% of patients cited being close to their home as their reason for choosing the hospital, 20.3% were referred to the hospitals and 17.2% trusted the hospital as it belonged to the government,15.8% of patients had been treated at the hospital before, only 1% considered the hospitals to be affordable.

Medical conditions versus transportation modes

Figure 1 shows a heat map describing the percentage of patients, grouped by each medical category, who attended the hospitals with different transportation modes.

The majority of patients with all types of medical conditions used either their car or the ride-shared service car. Ambulance came as either the third or fourth choice for transportation including for those patients with life-threatening

conditions. A large proportion of patients with trauma problems (30%) used motorcycles to reach the hospital. Only 10% of patients with trauma and 14% with cardiovascular diseases used an ambulance.

A more detailed breakdown of medical conditions and the associated means of transport is given in the heat map shown in Fig. 2.

At an aggregated level, pyrexia made up the largest group of patients. Patients with this illness came to the hospital by many different modes of transport, including motorcycle which came second after own car. Patients who used an ambulance to go to the hospital were mainly those with diabetes and hypertension problems.

Travel duration and arrival time analysis

The survey recorded 1,964 patients. For those patients who arrived during December, the median total daily arrivals are 64 patients (IQR: 50 to 70 patients). There is a peak in the last week of December with 115 patients attending the hospitals. However, at the end of December, the number of patient arrivals falls to a value consistent with the median value.

Analysis on hourly patient arrivals revealed that the smallest number of patient arrivals is experienced between midnight and 7 am. There are three peaks during the day, with the highest peak occurring between 8 am and 11 am. The second peak is between 2 pm and 4 pm. The third peak is between 7 pm and 10 pm. The lowest values during the day are experienced at 1 pm and from 5 pm to 6 pm. The summary statistics showed that the median number of arrivals is 3 patients at any hour. The minimum number of arrivals in an hour is 1 and the maximum is 20.

Figure 3 illustrates the six time-stamps collected for the study. Patient delay represents the time between the emergency occurring and the decision to go to hospital. Transport response time represents the time between the decision to go to the hospital and transport arrival. The time on the scene represents the duration between the arrival/availability of transport and the time to go to the hospital. Travel time is the time from leaving the site until arrival at the hospital. The patient waiting time represents the time from patient arrival at the hospital and the start of treatment. The time to treatment was defined as the duration between the time when the emergency events happened and the time when the patient received the treatment for the first time. Tables 5 and 6 present the five time-spans in conjunction with transport modes and medical categories.

Table 5
Summary for the time analysis by different transportation modes used by the patients.

Time analysis	Combined (N = 1965)	Ambulance (N = 182)	Own car (N = 596)	Ride-sharing service car (N = 598)	Motorcycle (N = 387)	Taxi (N = 61)	Public transport (N = 65)	Other (N = 75)	Kruskal-Wallis* p-value
	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)	
Patient delays (hours)	0.4 (0.1, 1.0)	0.3 (0.1, 1.0)	0.3 (0.1, 1.0)	0.5 (0.2, 1.0)	0.5 (0.1, 1.2)	0.3 (0.1, 1.0)	0.3 (0.2, 1.5)	0.5 (0.1, 1.5)	0.2653
Transport response time (hours)	0.2 (0.0, 0.5)	0.4 (0.2, 0.9)	0.2 (0.0, 0.5)	0.3 (0.2, 0.5)	0.1 (0.0, 0.3)	0.3 (0.2, 0.4)	0.3 (0.1, 0.5)	0.2 (0.0, 0.5)	< 0.0001
Time on scene (minutes)	0.3 (0.0, 10.0)	5.0 (0.0, 15.0)	2.5 (0.0, 10.0)	5.0 (0.0, 10.0)	0.0 (0.0, 10.0)	0.0 (0.0, 5.0)	5.0 (0.0, 15.0)	0.0 (0.0, 0.0)	< 0.0001
Travel time (hours)	0.6 (0.4, 0.9)	0.7 (0.5, 1.0)	0.7 (0.5, 1.0)	0.6 (0.4, 0.9)	0.5 (0.3, 0.7)	0.6 (0.5, 0.8)	0.7 (0.5, 0.9)	0.6 (0.3, 1.0)	< 0.0001
Patient waiting time (minutes)	5.0 (0.0, 10.0)	0.0 (0.0, 10.0)	4.5 (0.0, 10,0)	3.0 (0.0, 10.0)	5.0 (0.0, 10.0)	3.0 (0.0, 14.0)	5.0 (0.0, 10.0)	5.0 (0.0, 14.5)	0.2344
Time to treatment (hours)	1.8 (1.1, 3.0)	2.0 (1.3, 4.5)	1.7 (1.1, 3.0)	1.9 (1.2, 3.1)	1.5 (1.0, 2.5)	1.5 (1.1, 2.5)	2.0 (1.3, 3.4)	2.0 (1.1, 3.4)	< 0.0001

* The test was conducted on different types of transport modes. Med = median, IQR = (Q1, Q3)

Table 6
Summary for the time analysis by different medical groups of main health problems experienced by the patients.

Time analysis	Combined (N = 1964)	General Medical (N = 1236)	Cardiovascular (N = 130)	Respiratory (N = 301)	Trauma (N = 169)	Neurological (N = 72)	Other (N = 56)	Kruskal-Wallis* p-value
	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)	Mead (IQR)	Med (IQR)	Med (IQR)	
Patient delays (hours)	0.4 (0.1, 1.0)	0.3 (0.2, 1.0)	0.3 (0.1, 2.0)	0.5 (0.2, 2.0)	0.3 (0.1, 1.0)	0.5 (0.1, 1.5)	0.5 (0.2, 1.0)	0.0011
Transport response time (hours)	0.2 (0.0, 0.5)	0.2 (0.0, 0.5)	0.3 (0.1, 0.5)	0.3 (0.1, 0.5)	0.1 (0.0, 0.3)	0.3 (0.0, 0.6)	0.2 (0.0, 0.3)	< 0.0001
Time on scene (minutes)	0.3 (0.0, 10.0)	2.0 (0.0, 10.0)	0.0 (0.0, 5.0)	0.0 (0.0, 10.0)	0.0 (0.0, 10.0)	0.0 (0.0, 11.3)	5.0 (0.0, 10.0)	0.2167
Travel time (hours)	0.6 (0.4, 0.9)	0.6 (0.4, 0.9)	0.5 (0.4, 0.9)	0.6 (0.4, 0.9)	0.6 (0.3, 0.8)	0.7 (0.4, 1.1)	0.6 (0.4, 0.9)	0.07628
Patient waiting time (minutes)	5.0 (0.0, 10.0)	3.0 (0.0, 10.0)	5.0 (0.0, 10.0)	5.0 (0.0, 10.0)	5.0 (0.0, 10.0)	0.0 (0.0, 5.0)	5.0 (0.0, 10.0)	0.00066
Time to treatment (hours)	1.8 (1.1, 3.0)	1.8 (1.1, 2.8)	1.7 (1.1, 5.0)	2.0 (1.2, 3.8)	1.3 (1.0, 2.4)	2.0 (1.4, 4.6)	1.5 (1.1, 3.0)	< 0.0001

* The test was conducted for different medical conditions. Med = median, IQR = (Q1, Q3)

Patient delays

Overall, the median duration of patient delays is around 24 minutes with IQR: 6 to 60 minutes. Across different types of transport, the median patient delays range from 18 to 30 minutes. However, the median duration of patient delays is significantly different between medical groups. Patients with cardiovascular diseases and respiratory problems taking a longer time compared to other patients to decide to go to the hospitals (75% of patients took up to 2 hours). Patients' awareness of the symptom may have contributed to the delay in making a decision.

Transport response time

The results for the transport response time show a significant difference between at least two categories, by transport modes and medical groups. In total, the survey indicates that 75% of the transport takes about half an hour to reach the patient. The median response time for an ambulance is 24 minutes. The IQR for the ambulance (from 12 to 54 minutes) is the longest compared to other modes of transport. The motorcycle had the shortest median response time of all. It is likely that the high IQR for ambulances is at least in part because ambulances have the furthest distance to travel, and they do not have an automatic right to priority in congested traffic.

Within different medical groups, patients experiencing cardiovascular diseases have a similar median duration of transport response as those having neurological and respiratory problems (18 minutes). The shortest duration is experienced by those patients with trauma (median 6 minutes, IQR: 6 to 18 minutes).

Time on scene

At the aggregated level, the time spent on the scene by all modes of transport has a median of 0.3 minutes (IQR: 0 to 10 minutes). Ambulance median time on the scene is 0.5 minutes, and 75% of ambulances spent up to 15 minutes on the scene. There is no significant difference in time spent on the scene, for different medical conditions, time spent on scene for 75% of patients was up to 10 minutes.

Travel time to hospital

The duration of travel to the hospital shows a significant difference among at least two different transport modes. Ambulance and own car share a similar median of 42 minutes, with IQR from 30 to 60 minutes. The shortest median travel time was experienced by patients using motorcycles (30 minutes, IQR: 18 to 42 minutes). There does not appear to be any significant time difference in the duration of travel for different medical conditions.

Patient waiting time.

The results for the patient waiting time by different transport modes do not show any significant difference. However, (as expected) different medical conditions show a significant difference in the time patients spent on waiting to be treated. Patients with trauma, cardiovascular, and respiratory problems share a similar median time of 5 minutes when waiting to be treated.

Time to treatment

Patients who arrive via ambulance show the longest median time to treatment (120 minutes, IQR: 78 to 270 minutes). In terms of medical condition, patients with neurological problems experience the longest time to treatment (median 120 minutes, IQR: 84 to 276 minutes).

Discussion

The result section provides detailed findings answering the study questions on patients' characteristics including their medical conditions, method of transport to go to the hospital, and how ambulances fared compared to other mode of transports. This section answers the fourth research question. It highlights significant findings from the survey, which provide insight into barriers to accessing the pre-hospital and emergency services in Jakarta.

The majority of patients attending the hospital emergency department had general medical problems (63%), compared to life-threatening conditions such as trauma and cardiovascular diseases (15.2%). Although studies have found that a significant number of patients attending hospital emergency departments had non-emergency conditions[15]. This is not to suggest that the patients did not have serious underlying conditions[16]. Patients' perceived illness severity and the accessibility of the emergency department compared to other clinics may have motivated patients to attend the hospital emergency departments[17]. The low number of patients with threatening conditions may be because patients with such conditions will access the specialist hospitals in Jakarta.

Patients travelled to the hospital emergency departments by various modes of transport which in many cases were not suitable for their conditions. The majority of patients with trauma or respiratory problems used motorcycles or their own car, and a large number of patients with cardiovascular diseases did not use an ambulance as would be recommended[18]. Currently ambulances in Indonesia are used mainly for referrals or inter hospitals transportation[5], rather than emergency response[8]. The low utilization of ambulances (9.3%) is not surprising. In reality, those patients who are aware of the existence of the ambulance service, prefer to prioritise rapid access to professional treatment at the hospital rather than waiting the additional time for an ambulance to arrive. The high cost of the service tends to

exacerbate this. Although each healthcare facility within Jakarta has its own ambulance, there is no regulation or standardisation concerning the provision of the emergency care. This contributes to variation in the quality of equipment and services. Further, there are currently 6 emergency numbers operating in Indonesia, which may cause confusion at the event of emergency.

Patients with trauma and cardiovascular diseases spent up to 5 hours from the onset until treatment. Long hours until treatment seems common in the acute myocardial infarction system of care in developing countries[19]. This is alarming since a delay in receiving pre-hospital care for patients with these conditions can increase hospital mortality[20]. Patients' lack of awareness of the symptom can contribute to the delay in accessing the pre-hospital and emergency services[21].

Patients' reasons for not using ambulances included the availability of the service, the cost burden associated with using an ambulance, and the lack of awareness of the existence of ambulance services. Only ambulances provided by the government are free, unfortunately the service is compromised by the long waits for the ambulance to become available.

In summary, access barriers to the pre-hospital and emergency services in Jakarta can be contributed by many factors. These include: patients' socio-economic status, patients' awareness of disease symptoms and access to the health services, and the availability of services, such as ambulances, at the event of emergency.

Suggestions

The provision of prompt emergency transportation is an important element in pre-hospital and emergency services. In certain medical conditions such as dyspnoea[22] (breathing problems), trauma and cardiovascular diseases[23], delay in calling for emergency services can be fatal[24]. To reduce the delay, healthcare providers can improve patients' awareness of related symptoms as well as access to emergency transport.

A significant barrier to accessing emergency transport, in developing countries is the associated costs which are not included in health insurance provision[25]. A possible strategy is to integrate the emergency services into the existing healthcare services tailored to the local needs and conditions[26]. The inclusion of emergency transport (private and public) in national health insurance with certain rules and regulations may serve as a solution. This would enable equal access for individuals in need and minimise the impact on healthcare costs. Another barrier is related to the lack of priority given to ambulance vehicles in congested traffic. This means that ambulances travel no faster than ordinary traffic, creating a situation where an ambulance is always likely to be the slowest form of transport to a hospital. The final barrier is public awareness of the ambulance service and the potential benefits it brings to patients.

If these barriers could be addressed fully or in part, there is potential to significantly increase survival rates from trauma, stroke, and ischemic heart disease for the population as a whole. Finally, improved data collection would enable more detailed monitoring and study of healthcare demand and capacity. It will provide a better picture of the current utilization of the emergency services and help to make informed decisions about the impact of these recommendations and the subsequent healthcare resource allocation decisions.

Limitations

This study is subject to some potential limitations. Patients of all ages were included in the survey which means that children relied on their parents to answer the questionnaires. The survey was not able to follow-up on patient outcomes. It would be useful to measure the outcomes based on different transportation modes used by the patient and time to treatment. The survey involved a relatively small number of hospitals compared to the numbers across the city, although care was taken to try and work with a representative sample of hospitals with emergency departments.

The time data is dependent on patients' recall, which may not be accurate. Generally, time data, in relation to transportation use by the patients, is not part of hospital data collection. Including the time data, wherever appropriate, in a routine hospital data collection could be introduced in the future. The time data could be used to evaluate the effectiveness and efficiency of the healthcare services.

Conclusions

The study results suggest that pre-hospital and emergency services in Jakarta require improved organisation. This includes increasing capacity and affordability of ambulances and improving pre-hospital and emergency services awareness. Adequate capacity and affordability of ambulances ensure the accessibility for all the population in need. Improved awareness can be achieved by providing clear information and guideline on the appropriate and timely use of ambulances.

Declarations

Ethical approval and consent to participate

Ethical clearance was granted by the ethics committee from Sumber Waras Hospital, "*Rumah Sakit Sumber Waras Komite Etik Penelitian*" No:001//RSSW/Kom.EP/EC/XI/2019. The majority of questionnaires were part of routine hospital data collection, hence consent was sought verbally. Parents and guardians represented patients under 18 years of age.

Consent for publication

Not Applicable.

Competing interests

The authors declare that there is no conflict of interest.

Authors' contributions

All authors participated in the design and coordination of the study. JJB, SNB, PH, APR, and ADP designed the questionnaires. JL and JTR provided medical codes used in the survey. APR and ADP organised and conducted the survey. SNB performed data analysis. MT, DG, VK, PH, ADP and SNB contributed to the manuscript draft. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets used and/or analysed during this study are available from the corresponding author on reasonable request.

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Figures

	Ambulance	Motorcycle	Other	Own car	Public transport	Ride-sharing service car	Taxi
Trauma	10%	30%	4%	30%	4%	20%	2%
Respiratory	8%	18%	3%	32%	3%	32%	3%
Other	18%	23%	4%	23%	2%	25%	5%
Neurological	24%	4%	3%	31%	3%	35%	1%
Medical	8%	21%	4%	31%	4%	31%	3%
Cardiovascular	14%	8%	5%	28%	1%	39%	4%

Figure 1

Heat Map; Distribution of transport choices and medical categories.

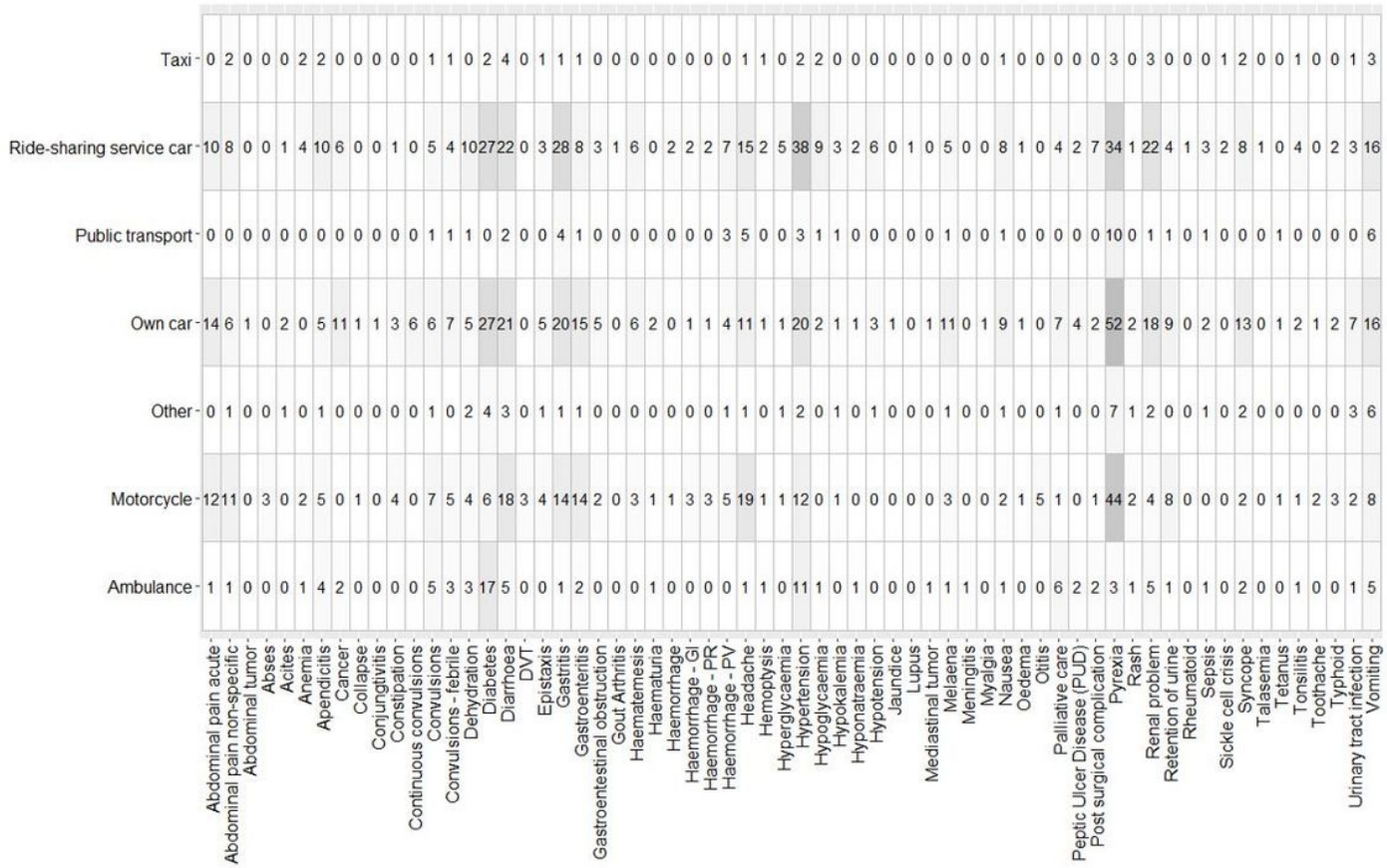

Figure 2

Heat map; Distribution of transport choices and medical conditions.

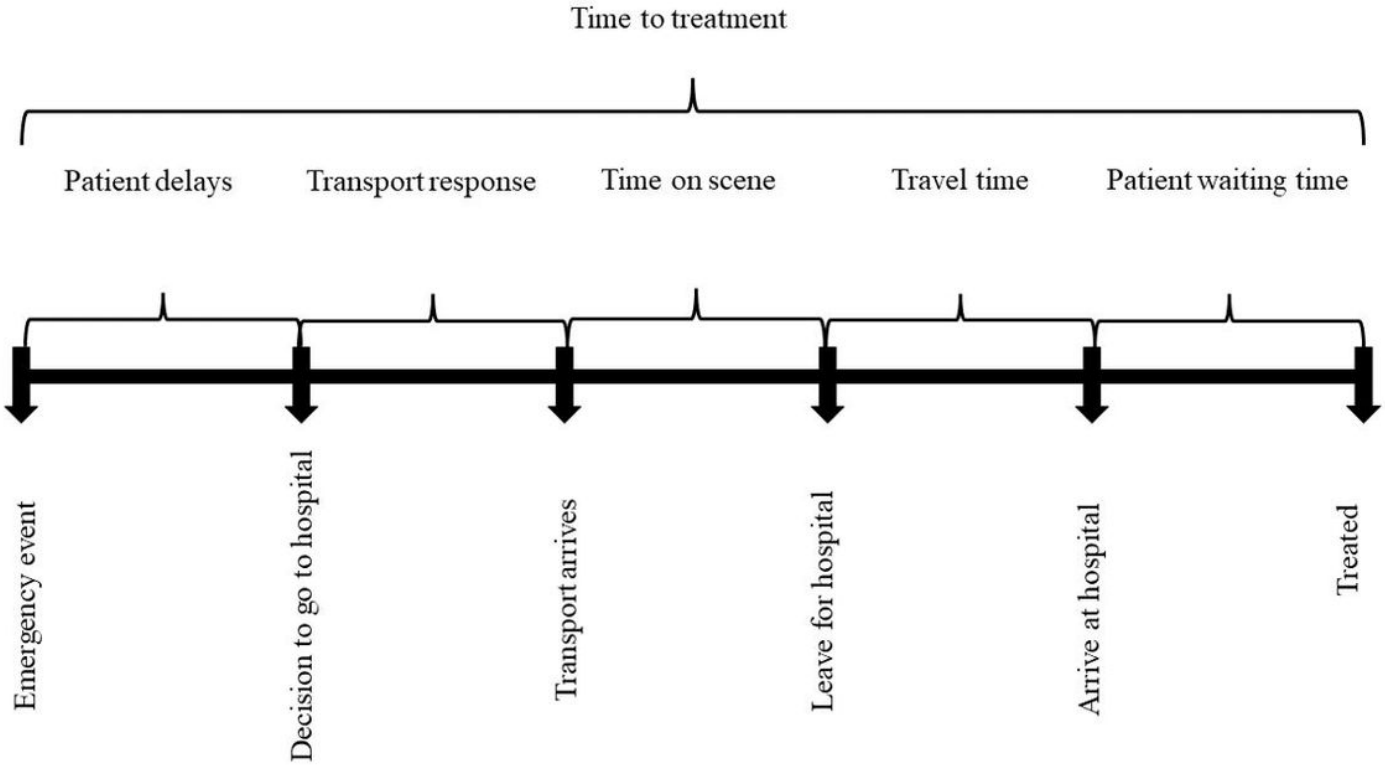

Figure 3

Description of the time-stamps used in the survey.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryFileTable1.docx
- SupplementaryFileTable4.docx