

Hospital Care Utilisation Patterns among the Elderly at Referral Hospitals in Malaysia

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ABSTRAK

Populasi manusia di seluruh dunia semakin meningkat dan peningkatan ini semakin ketara dalam kalangan warga tua yang berumur 60 tahun ke atas. Penduduk warga tua ini semakin menghampiri 13% daripada populasi global. Akibatnya, penyakit berkaitan dengan geriatrik dijangka akan meningkat dan memberi tekanan khususnya kepada sistem penjagaan kesihatan. Tujuan kajian ini adalah untuk menerokai corak pengamalan khidmat penjagaan kesihatan di hospital dalam kalangan warga tua di hospital tertiar awam di Malaysia. Kajian keratan rentas retrospektif telah dijalankan dengan persampelan rekod perubatan pesakit warga emas dalam lingkungan usia 60 tahun ke atas daripada empat hospital tertiar di Malaysia. Data-data telah dikumpulkan melalui penggunaan borang soal selidik berstruktur. Sejumlah 434 rekod perubatan yang memenuhi kriteria kajian ini telah dikenal pasti. Sementara itu, sejumlah 561 rekod penjagaan pesakit dalaman telah dicatatkan. Daripada jumlah ini, sebanyak 54.7% penjagaan

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adalah di wad perubatan. Purata tempoh perawatan ialah 5.8 hari bagi setiap penjagaan. Penyelidikan makmal bagi setiap pesakit warga tua mencatatkan nilai purata sebanyak 27.48 semasa tempoh penjagaan. Jumlah pengambilan ubat pula ialah 8.91 untuk setiap pesakit sementara jumlah pengambilan antibiotik pula ialah 0.89 bagi setiap pesakit semasa tempoh penjagaan tersebut. Pesakit warga tua di Malaysia memerlukan jumlah penjagaan kesihatan yang lebih tinggi. Pihak bertanggungjawab disarankan agar meningkatkan promosi berkaitan dengan penjagaan kesihatan dan pencegahan penyakit secara sendiri yang berupaya mengurangkan kadar penjagaan kesihatan yang tinggi di hospital dalam kalangan warga tua.

Kata kunci: komorbiditi, Malaysia, pengalaman penjagaan kesihatan, penghospitalan, warga tua

ABSTRACT

The global human population is increasing, and this increase is more common among the elderly (people aged 60 years old and above). The elderly population is approaching 13% of the global population. Consequently, geriatric-related illnesses are expected to be more prevalent, exerting explicit pressure on healthcare systems. We explored the healthcare utilisation patterns among the elderly at public referral hospitals in Malaysia. We performed a retrospective cross-sectional study with a representative sample of elderly patients' medical records from four referral public hospitals in Malaysia. Multiple types of data were collected from the hard-copy medical records via a structured observational checklist. A total of 434 medical records were included in the study via systematic random sampling. There were a total of 561 inpatient episodes of care. Up to 54.7% of the episodes were in the medical wards. The average length of stay was 5.8 days per episode. An average of 27.48 laboratory investigations were consumed per inpatient episode. Approximately 8.91 medications and 0.89 antibiotics were consumed per episode. Elderly patients consume a large proportion of the hospital services in Malaysia. It is recommended that the authorities should adopt health promotion and disease prevention policies that can reduce the high healthcare utilisation among elderly Malaysians.

Keywords: co-morbidities, elderly, Malaysia, healthcare utilisation, hospitalisation

INTRODUCTION

Since 2002, the World Health Organisation (WHO) has used the term "active aging" to recognise elderly

humanitarian rights for extending life expectancy (WHO 2002). In 2015, the WHO adopted several strategies to guide the development of such an effective system. These strategies

included supporting and building the capacities of paid and unpaid caregivers and promoting integrated care via case management strategies (WHO 2015).

According to international reports, human life expectancy is increasing; in the recent two decades, it increased by 10 years (United Nations 2017; Wang et al. 2016). This increase can be attributed to the advance and increased access to healthcare services (WHO 2015). Additionally, the global human population is increasing; an increased percentage of the elderly population, i.e., people aged 60 years old and above, has become more common (United Nations 2017). This highlights the fact that the global human population is aging rapidly (Chatterji et al. 2015; Mercer et al. 2016).

Currently, this age group is approaching 13% of the global population, with a 3% annual growth rate (United Nations 2017). Elderly people are expected to increase from 900 million to 2 billion between 2015 and 2050 (United Nations 2017; WHO 2018). Consequently, geriatric-related illnesses are expected to be more prevalent and increased explicit pressure on healthcare systems, leading to an urgent need for comprehensive healthcare services which appropriate for elderly needs (Chatterji et al. 2015; Mercer et al. 2016; WHO 2015).

Globally, healthcare utilisation rates are escalating (Moses et al. 2019) and aging population is one of the most important causative factors (Dieleman et al. 2017; Lopreite & Mauro 2017; Moses et al. 2019; Wammes et al.

2018). This elevated healthcare utilisation has increased spending on healthcare services (Global Burden of Disease Health Financing Collaborator Network 2019). Through identifying the factors associated with increased healthcare utilisation and cost, it can help policymakers to suggest efficient healthcare services (Dieleman et al. 2017).

Within the context of Malaysia, life expectancy increased from 71.3 years between 1990 and 1995 to 75.5 years between 2015 and 2020. Malaysians' life expectancy is expected to reach 80.1 years between 2045 and 2050 (United Nations 2017). The Malaysian population is expected to reach 41.5 million in 2040, with 14.5% aged ≥ 60 years old and above by then (Department of Statistics 2016). The total Malaysian citizen population numbered 29.7 million in 2020, with 10.7% aged 60 years (Department of Statistics 2020). The aim of the present study was to explore the healthcare utilisation patterns among the elderly at public referral hospitals in Malaysia.

MATERIALS AND METHODS

This was a retrospective cross-sectional study. Four public referral hospitals were included in this study; two tertiary teaching hospitals and two public hospitals. Additionally, these hospitals are considered as referral centers in the Malaysian healthcare system.

Target Population

The target population was elderly Malaysian citizens, i.e., those aged

≥60 years old, who sought inpatient healthcare services at the included hospitals during 2017. The patients who had discharged home after obtaining full inpatient care in the healthcare setting were included.

We excluded patients aged <60 years old and elderly patients with known psychiatric problems (i.e. dementia and Alzheimer disease); history of alcohol or drug abuse; serious physical disability (bedridden, wheelchair user); terminal illness; discharge status of transferred to other care facilities, against medical advice, died before discharge, or unknown.

Data Sampling

The co-investigator in each included hospital obtained the medical records in a systematic random manner. The first data collection step was to check for the presence of any of the exclusion criteria. Two hospitals had casemix databases and the patient lists were obtained from the casemix system based on exclusion criteria. Additional checks for the criteria were performed when the data were extracted from the hard-copy medical records. For the hospitals without casemix databases, the patient lists were obtained after preliminary selection of the long patient list from the medical records departments. Preliminary selection was performed to identify patient's age based on their national identification (ID) number. Due to the absence of comprehensive electronic medical records in the two hospitals, all exclusion criteria screening were performed on-site. Data were collected

retrospectively via reported case for inpatient episodes during 2017 at all four hospitals. Medical records that did not include patient admissions during 2017 or that did not match the inclusion criteria were excluded.

Sample Size

The sample size was calculated using the Cochran (1963) formula for prevalence studies. Based on the formula, the minimum sample size was approximately 400 medical records which were 100 medical records from each hospital. To attain this sample size, a total of 150 medical records from each hospital with a casemix database were prepared. For the hospitals without a casemix database, a total of 150 medical records from each hospital were prepared to overcome the exclusion cases detected on-site and while extracting the data from the hard-copy medical records.

Ethical Approval

The study was approved by the Universiti Kebangsaan Malaysia Medical Research Ethics Committee under reference UKM PPI/111/8/JEP-2019-024 and by the Malaysian Medical Research and Ethics Committee (MREC) under reference KKM/NIHSEC/P19-1689(12).

Data Collection Tool

Data were collected via a well-structured observational checklist. The checklist was used with reference to the data collection tool by Aljunid

et al. (2014). The checklist comprised of 50 items related to the study. The questions were grouped into one introductory section and two other sections. The introductory questions were related to the hospital data and reference number of the patients' medical records. The second part of the checklist (section one) comprised of the patients' sociodemographic data. The third part of the checklist (section two) comprised of the patients' medical background; date of admission, primary and secondary diagnosis, medical procedures, laboratory investigations, radiology and other investigations, oral and parenteral prescribed treatment, consumables used and other services provided during their admission in the hospital setting.

Data Collection

Two of the included hospitals used casemix systems. For these hospitals, the patient lists were obtained directly from the casemix systems after exclusion criteria screening. Additional checks for matching the criteria were performed on-site while extracting the data from the medical records. For the two hospitals without casemix systems, the patient lists were obtained from the medical records departments. Preliminary screening was performed as described in the Data Sampling section. The data collection was done between November 2019 and December 2020. The data collection period was delayed due to the government's movement control order response to the COVID-19 pandemic in Malaysia. The study used SPSS version

20.0 for Windows (SPSS Inc., Chicago, IL, USA). The data were analysed with descriptive statistics, cross-tabulation, and general scores.

RESULTS

Table 1 showed the sociodemographic characteristics of the sample. A total of 434 medical records were assessed for healthcare utilisation during 2017. There were a total of 561 episodes of inpatient care (admissions) for elderly patients. Male patients represented 53.9% of the total sample. The most common age groups were the 60-65 years old (27.9%), 76 years old (26.7%) and 66-70 years old (26.0%) groups. Regarding to the distribution of ethnicity, Malays comprised 58.5% of the total sample, followed by Chinese

Table 1: Socio-demographic characteristics of the study sample

Variable	Total, n(%) [†]
Distribution of medical records and episodes of care	
Number of medical records	434 (100)
Total number of inpatient episodes	561 (100)
Gender	
Male	234 (53.9)
Female	200 (46.1)
Age groups	
60 - 65 years old	121 (27.9)
66 - 70 years old	113 (26.0)
71 - 75 years old	84 (19.4)
76 years or old above	116 (26.7)
Ethnicity	
Malay	254 (58.5)
Indian	56 (12.9)
Chinese	124 (28.6)
Marital status	
Single	9 (2.1)
Married	414 (95.4)
Others	11 (2.5)

[†]Percentage out of total sample

(28.6%) and Indians (12.9%). Regarding to the marital status, 95.4% of the participants were married.

Table 2 showed the wards to which the patients were admitted during their inpatient episodes of care and their discharge status. More than half of the healthcare episodes (54.7%) took place in the medical wards and 96.4% were discharged with future follow-up recommendations.

Regarding to the length of stay during the episodes of care, 3 days (n = 108, 19.3%) and 6 days (n = 194, 34.6%) were the most frequent durations for the elderly inpatient episodes of care. In total, 47.7% of the cases were admitted for more than 4 days per inpatient episode of care. The overall average length of stay (ALOS) among all participants was 5.76 days (SD = 5.18) per episode of care. There was a mean total of 1.32 admissions per elderly patient (SD = 0.75).

Figure 1 showed the total number of diagnoses (primary and secondary) reported during the elderly inpatient episodes of care. The most frequent number of diagnoses reported were single diagnosis (20.9%, n = 117),

Table 2: Wards and discharged status of inpatient episodes

Status of inpatient episodes	Total, n (%) [†]
Hospital ward	
Medical	307 (54.7)
Surgical	77 (13.7)
Orthopedic	20 (3.6)
Others	157 (28.0)
Discharge Status	
Recover without F.U.	20 (3.6)
Recover with F.U.	541 (96.4)

[†]Percentage out of total sample; F.U.=follow up

followed by three diagnoses (21.2%, n = 119) and four diagnoses (20.1%, n = 113). A mean of 3.21 diagnoses (primary and secondary) were reported per episode of inpatient care.

Table 3 shows the most commonly reported primary diagnoses during the inpatient episodes of care. The most commonly reported primary diagnoses were ischemic heart disease (10%), cardiovascular disease (6.8%), and chronic lower respiratory disease (5.9%).

Figure 2 showed the most commonly reported secondary diagnoses during the inpatient episodes of care. The top four reported secondary diagnoses were hypertension (57.2%, n = 321),

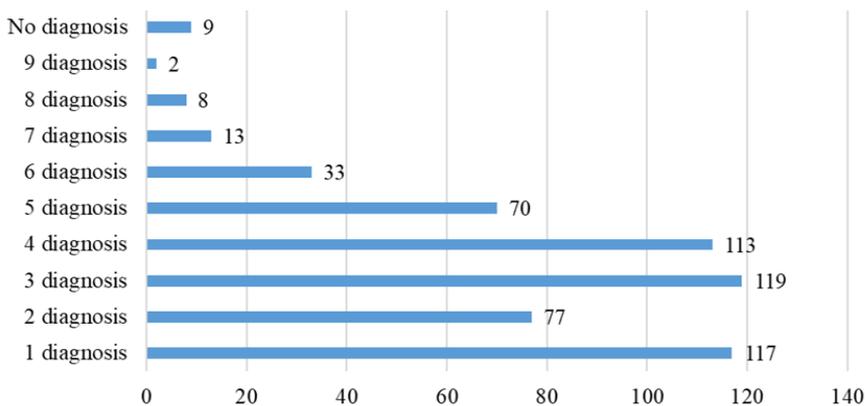


Figure 1: The total number of reported diagnosis

Table 3: The most commonly reported primary diagnosis

Types of disease	Total, n (%) [†]
Ischaemic heart disease	56 (10)
Cardiovascular disease	38 (6.8)
Chronic lower respiratory D.	33 (5.9)
Other forms of heart D.	30 (5.3)
Gallbladder, biliary, and pancreas disorder	26 (4.6)

[†]Percentage out of total sample

diabetes mellitus (38.5%, n = 216), metabolic disorders (20.5%, n = 115), and ischemic heart disease (18.2%, n = 102). It was worth mentioning that 22.3% of the sample (n = 125) did not have any documented secondary diagnosis.

Figure 3 showed the most frequently reported medical procedure codes during the inpatient episodes of care. The most common procedures coded were blood transfusion (n = 72), electrocardiogram (ECG) (n = 58), X-ray (n = 40), and other abnormal blood chemistry tests (n = 26).

Figure 4 showed the most frequently laboratory investigations requested for elderly patients admitted to the hospitals. The most frequently requested laboratory investigations

were renal profile (86.8%, n = 487), full blood count (73.9%, n = 415), liver function test (65.1%, n = 365), hemoglobin (59.7%, n = 335), and platelet count (59%, n = 331). The packed-cell volume (PCV) (the hematocrit test) (43.9%, n = 246), activated partial thromboplastin time-partial thromboplastin time-International Normalized Ratio (APTT-PTT-INR) (43.9%, n = 246), total white blood cell count (43%, n = 241), blood glucose level (37.1%, n = 208), arterial blood gas-venous blood gas (ABG-VBG) (33.2%, n = 186), and total white cell differential test (33.2%, n = 186) were also frequently requested investigations, but at lower rates compared to the most commonly requested investigations. These findings revealed the varied test requesting behavior of physicians among the hospitals.

The most frequently requested laboratory investigations were blood albumin (31.7%, n = 178), cardiac enzymes (25.8%, n = 145), full examination and microscopic examination (FEME) (25.1%, n = 141), full lipid profile (15.2%, n =

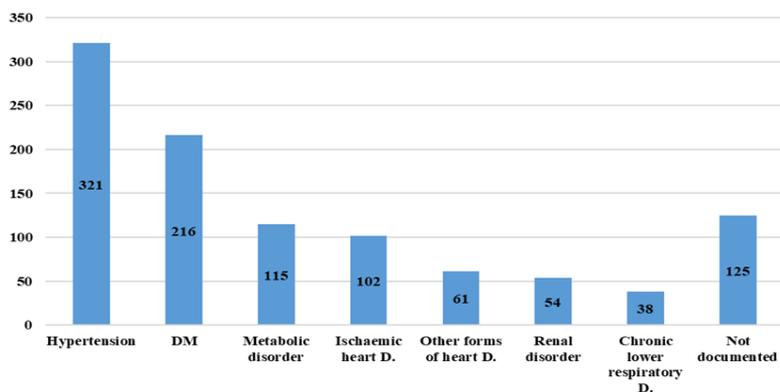


Figure 2: The most common reported secondary diagnosis

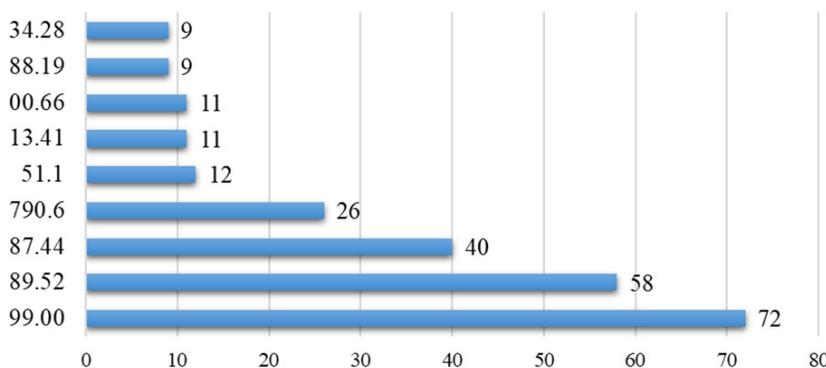


Figure 3: The most common reported medical procedures codes

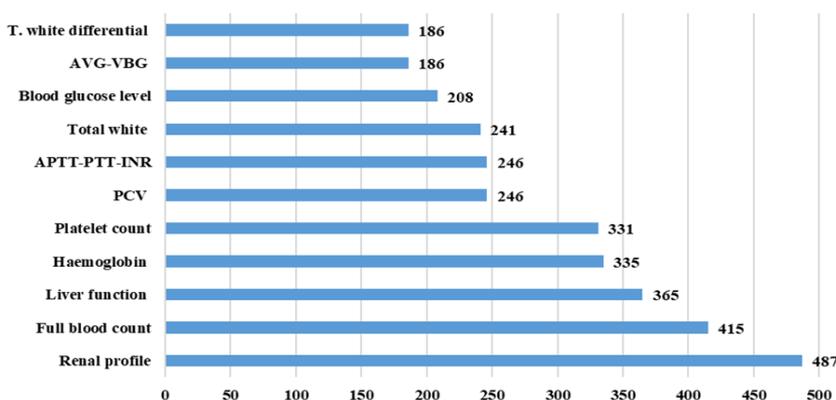


Figure 4: The most common reported laboratory investigations

85), blood culture sensitivity (14.4%, n = 81), creatine kinase myoglobin binding (CKMB) (12.8%, n = 72), blood magnesium level (11.6%, n = 65), blood calcium level (9.8%, n =

55), sputum culture sensitivity (9.1%, n = 51), and HB1C tests (9.1%, n = 51). These findings also revealed the varied laboratory test requesting behavior by physicians from the included hospitals.

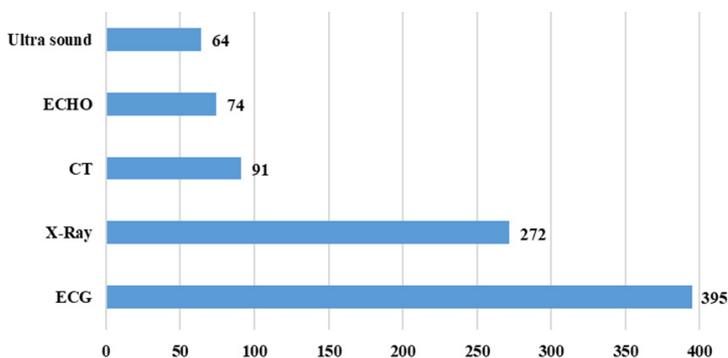


Figure 5: The most common consumed imaging investigations

Figure 5 showed the most common imaging investigations consumed by elderly patients during their episodes in inpatient care. The five most frequent imaging investigations were ECG (70.4%, n = 395), X-ray (48.5%, n = 272), computed tomography (CT) scan (16.2%, n = 91), echocardiogram (ECHO) (13.2%, n = 74) and ultrasound (11.4%, n = 64).

Table 4 showed the mean investigations consumed by elderly patients admitted in the hospital setting. A mean of 9.33 laboratory investigations (types) and a mean of 1.7 other investigations (i.e. imaging and other investigations) were consumed per episode of care. The total mean frequency of all investigations consumed was 27.48 per episode of care.

Table 5 showed the findings related to the mean medication consumption by elderly patients during their inpatient episodes of care; 0.64 analgesics, 0.89 antibiotics, and 2.43 parenteral medications. The patients consumed a total mean of 8.91 medications per episode of care.

DISCUSSION

In the present study, we obtained a random sample of medical records for

Table 4: Elderly consumption of inpatient investigations

Variable	Mean	Std. Deviation
Types of consumed laboratory tests	9.33	4.599
Number of other investigations consumed	1.70	1.068
Frequency of all consumed investigations	27.48	28.405

elderly patients from four public referral hospitals in Malaysia. The study aimed at exploring the healthcare service utilisation patterns among elderly Malaysians at public referral hospitals. We performed this study using a structured and validated observational checklist by Aljunid et al. (2014). We obtained a total of 434 elderly patients' medical records with 561 inpatient episodes during 2017.

Among the total sample, the ALOS was 5.76 days per inpatient episode of care. This finding was lower than the national figure of 6.86 days per episode (Institute for Health Systems Research 2020). In Malaysia, one in every 20 citizens was admitted to a hospital in 2019. Among them, 16.6% were elderly patients (Institute for Public Health 2020). Additionally, higher ALOS are expected for private hospitals compared to public hospitals. It was worth noting that 75.3% of Malaysian inpatient healthcare episodes were in public hospitals while 25.5% of hospital admissions were in private hospital settings (Institute for Public Health 2020). Therefore, the difference in ALOS between our study and the national statistic could probably due to current study focused on elderly

Table 5: Elderly consumption of medications during inpatient episodes of care

Variable	Mean	Std. Deviation
Number of consumed analgesics	0.64	0.946
Number of consumed antibiotics	0.89	1.210
Number of consumed parenteral medications	2.43	2.550
Total number of consumed medications	8.91	5.309

patients and did not include patients from other age groups.

Herein, nearly half (47.77%) of the inpatient episodes spanned >4 days, which was higher than previous report which showed that 34.1% of the Malaysian population experienced an average >4 days of inpatient care (Institute for Health Systems Research 2020). The different indicated that elderly patients were considered as high-ALOS category compared to patients from other age groups. Herein, there was a mean total of 1.32 admissions per elderly patient per year, which was consistent with the national statistic of 1.31 inpatient episodes per year (Institute for Health Systems Research 2020).

In the present study, the most commonly reported primary diagnoses were ischemic heart disease, cardiovascular disease and chronic lower respiratory disease. Cardiovascular diseases are prevalent in Malaysia (Institute for Public Health 2020). The most commonly reported secondary diagnoses were hypertension, diabetes mellitus, metabolic disorders and ischemic heart disease. Diabetes and high blood pressure are among the most prevalent non-communicable diseases in Malaysia (Institute for Public Health 2020). Additionally, the prevalence of diabetes was consistent with that reported in Malaysian National Health and Morbidity Survey data, while hypertension prevalence was slightly lower (Sazlina et al. 2020). It was worth mentioning that inpatient episode prevalence among Malaysians was 5.2% (Institute for Health Systems

Research 2020).

Regarding laboratory tests, we determined that renal function tests, full blood count and liver function tests were the most commonly consumed laboratory investigations by the elderly. This was consistent with a recent study from the United Kingdom (Fanshawe et al. 2018). Horton et al. (2018) also reported that blood profile tests and urine analysis were the most common laboratory tests requested for elderly patients, which was consistent with our findings. Furthermore, our average laboratory test consumption findings were consistent with WHO guidelines (WHO 2019). Herein, the elderly patients consumed approximately 9.33 laboratory investigations during their inpatient episode of care while the overall count of all consumed laboratory investigations numbered approximately 27.5 tests per inpatient episode of care. It is worth noting that laboratory investigations were considered a vital part of inpatient services. A recent study showed that laboratory investigations were requested for the majority of admitted cases, noting that inpatient service accounted for half of the total laboratory requests in the hospital (Ngo et al. 2019). Knowledge of laboratory investigation consumption is crucial as overconsumption is a common problem (Vrijssen et al. 2020). Recent studies had shown that repeat testing of normal test results was a common problem (Reynolds & Wierzbicki 2019; Vrijssen et al. 2020). Additionally, laboratory test consumption increased gradually over time while a large proportion of these tests might be

inappropriate (Cadamuro et al. 2018). However, determining the percentage of appropriate test results in the present study is out of the current study scope and would be a suggestion for future studies. By using clinical decision support systems can reduce laboratory requests and total costs which can be a possible solution to such issues (Bellodi et al. 2017). Additionally, deep learning artificial intelligence systems are considered a promising and efficient laboratory investigations (Islam et al. 2021).

Herein, elderly patients consumed a mean of 8.91 medications per episode of care. This was similar to that of the study by Shankar et al. (2010), who reported 7.73 medications per episode of care, and another study conducted in Nepal (n = 9.8 medications per episode) by Sapkota et al. (2011). Additionally, we determined that the patients consumed a mean of 0.89 antibiotics per episode of care. This was less than that observed in a study conducted in Eritrea, which reported a mean of 1.29 antibiotics consumed per episode of care (Amaha et al. 2018). Global antibiotic misuse and bacterial resistance has increased (Garcia-Vello et al. 2020; Nabaweesi et al. 2021; Thabit et al. 2021) and the contributors to the increased resistance include clinical misuse, ease of antibiotics availability, and poor hospital prescribing regulations (Chokshi et al. 2019). According to Versporten et al. (2018), the antimicrobials used in East and Southeast Asia comprised of 37.2% of the average of whole countries, with 33% and 34.2% consumed in medical and surgical wards, respectively. This

indicator was 27.4-39% in the European countries and 38.6% in North America (Versporten et al. 2018). A recent study observed that 43.9% of patients consumed antibiotics during inpatient episodes of care (Maina et al. 2020). Furthermore, 68.2% of inpatient cases in Iran received antibiotics (Nabovati et al. 2021). Controlling of antibiotics usage would increase or maintain their ability to kill microorganisms (Wang et al. 2019). Herein, we expected that healthcare providers in Malaysia would exhibit high compliance with antibiotics protocols compared to those of other countries.

It was suggested that healthcare promotion and disease prevention programs should be adopted to reduce the high healthcare utilisation among elderly Malaysians. Additionally, standardising treatment guidelines would be an effective means of reducing the variations in different healthcare settings. The WHO drug utilisation and laboratory requesting indicators were expected to be additional factors for increasing the quality of healthcare services.

CONCLUSION

Elderly patients consumed a large proportion of healthcare services and were expected to be a good target for cost-effective initiatives. We reported variation in the patterns of healthcare services provided to the elderly at tertiary public hospitals in Malaysia, which nevertheless remained consistent with the national statistic. Additionally, tertiary referral hospitals, polypharmacy prescriptions,

and multiple investigation requests were expected to be more common, especially for the elderly, as they were expected to need more investigation as multimorbid cases. Therefore, elderly patients consumed a large proportion of investigations during their inpatient episodes of care. The prescribing patterns for medications were within the reported range in other countries. The patterns of antibiotics consumption in elderly patients of Malaysia were much more reasonable than those observed in other countries, indicating that the current antibiotics prescription policy is effective in reducing the irrational use of antibiotics.

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