PUSAT PERUBATAN UNIVERSITI MALAYA

UNIVERSITI SAINS ISLAM MALAYSIA
جامعة العلوم الإسلامية الماليزية
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

COVID-19 and Diagnosis-Related Group In An Asian Middle-Income Country:
Patient classifications and associated hospital costs

Authors:

Amirah Azzeri, Mohamad Helmi Mohamad Yasim, Muhammad Khairul Asraf Shah Nizamuddin, Mohd Hafiz Jaafar, Maznah Dahlui, Awang Bulgiba, Mohmmad Salleh Yahya. Nazirah Hasnan, Nadia Samsudin, Sharifah Faridah Syed Omar

The Leader In Medical Education
'Peneraju Pengajaran Perubatan'

Introduction

- The COVID-19 pandemic → considerable health burden on many healthcare systems worldwide

- Resulted in → significant economic and financial implications

- In Malaysia, the country was forced to prepare in coping with the additional pressure on the healthcare system to ensure that the services are not interrupted

- The changes to the delivery of usual clinical care & clinical management of COVID-19 patients → substantial impact on healthcare resource use.

- There is a need for Malaysia to generate data to estimate the downstream economic and budgetary consequences of the COVID-19 pandemic → to inform national COVID management strategies and to prepare for the subsequent outbreaks

- Robust estimates of the economic consequences → inform the development of national clinical strategies & optimise patient outcomes

- **University Malaya Medical Centre (UMMC)** → hybrid hospital (*a tertiary care centre that was responsible to provide care for COVID-19 and non-COVID-19 cases)

  - One of the strategies done by the UMMC: case-mix implementation

    - *Case-mix provides the healthcare system with a consistent method of classifying types of patients, their treatment episodes and associated costs. It involves developing and implementing a patient classification system, usually through the Diagnosis-Related Group (DRG) that categorizes patients according to their clinical conditions and healthcare resources used*

Aim of study

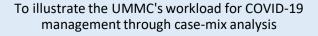➡ To illustrate the UMMC's workload for COVID-19 management through case-mix analysis

➡ To estimate the hospital expenditure incurred by UMMC for COVID-19 management

Descriptions of Diagnosis Related Groups (DRGs) related to COVID-19 cases at UMMC

- Patients' data on hospital admissions were extracted from the Hospital Information System (HIS) and discharge summaries

- Data:

  - Sociodemographic characteristics of patients such as patient identification, date of birth, age, admission date, discharge date, gender and discharge status

  - ICD-10 codes for the diagnoses (Primary and secondary diagnoses)
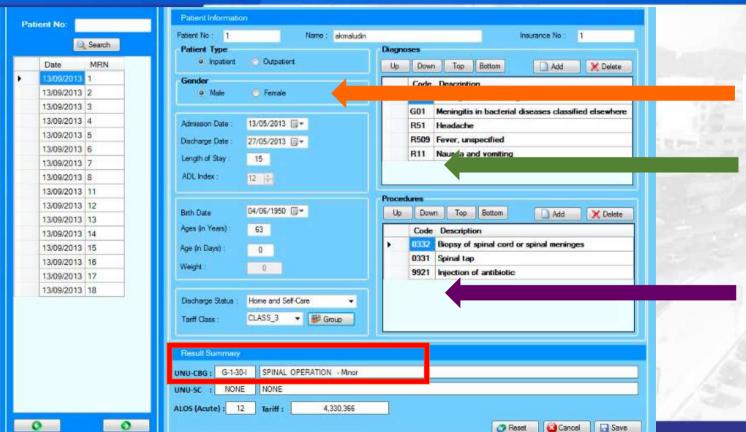
  - ICD-9-CM (Clinical procedures)

To illustrate the UMMC's workload for COVID-19 management through case-mix analysis

Methodology

- In UMMC, clinical procedures (ICD-9-CM) were in a free-type format → need to be coded for ICD-9-CM

- For the ICD-10 codes, the codes selected by the clinicians were checked to ensure that they were accurate

  - If the code was found to be wrong or unidentified, the patient's case note was used to confirm the diagnosis

  - Coded data (both ICD-10 and ICD-9-CM) & patient information were imputed in the grouper → produced the output of DRG

  - If the DRG output was an error, the input was identified and re-checked

- ***Cost of COVID-19 treatment and management at UMMC***

- A cost-of-illness study → combined approach of top-down and micro-costing methods

  - Hospital's perspective

  - Time horizon: one year

  - Costs reported were the direct medical costs for hospitalizations and intensive care unit (ICU) admissions due to COVID-19

  - Price year 2021

To estimate the hospital expenditure incurred by UMMC for COVID-19 management

- ***Cost of COVID-19 treatment and management at UMMC***

  - Data sources: financial report and discussions with experts [general overheads, hospitalizations, ICU admissions and COVID-19-related medicines]

  - Clinical pathways

  - Other cost components include:

    - Special allowance for healthcare workers for COVID-19 services

    - Costs of decanting for non-COVID-19 patients to other healthcare facilities

    - Expenditure for consumables and equipment related to COVID-19 management

    - *The cost of outpatient visits and COVID-19 vaccinations were not included

To estimate the hospital expenditure incurred by UMMC for COVID-19 management

- ***Cost of COVID-19 treatment and management at UMMC***

- Direct medical costs, the patients were categorized into two groups:

  - (i) admission to the general medical ward

  - (ii) admission to ICU

- To estimate the annual economic burden incurred by the centre → the average length of stay (general medical ward and ICU) based on the actual data was used

To estimate the hospital expenditure incurred by UMMC for COVID-19 management

The DRG codes used for COVID-19:

- A-4-13-I, A-4-13-II and A-4-13-III for mild, moderate and severe respectively**.** In the DRG code, the final digit, which is written as a roman number reflects the resource intensity level, which is mild, moderate or severe.

- The bigger the number, the greater the healthcare resource utilization required, and therefore the higher the costs.

Results - DRGs

DRG	Description	Frequency (n)	Percentage (%)
A-4-13-I	VIRAL AND OTHER NON-BACTERIAL INFECTIONS - Mild	3909	79.6
A-4-13-III	VIRAL AND OTHER NON-BACTERIAL INFECTIONS - Severe	630	12.8
A-4-13-II	VIRAL AND OTHER NON-BACTERIAL INFECTIONS - Moderate	274	5.6
	TOTAL	4813	98

Results - Costs

Cost components	Admission to Ward (USD)	Admission to ICU (USD)
General overheads per treatment episode	37.59	37.59
General medical ward per diem per patient	219.03 *(1971.24) (ALOS =9 DAYS)	219.03 *(2847.34) (ALOS =13 DAYS)
ICU per diem per patient	-	1252.33 *(10020.46) (ALOS = 8 DAYS)
COVID-19-related medicines per patient per treatment episode	-	4394.87
Total cost per admission per patient	2008.83	17,300.26
Cumulative costs of all patients treated at UMMC	859,3761.55	18,597,779.00

Results - Costs

Cost category	Expenditure (USD)
Total direct medical cost to treat COVID-19 patients	27,191,540.55
Special allowance for healthcare workers for COVID-19 services	1,722,451.28
Costs of decanting non-COVID-19 patients to other healthcare facilities	893,555.60
Expenditure for consumables and equipment related to COVID-19 management	575,456.32
The total cost incurred to manage COVID-19	30,383,003.76

Discussion

- Case-mix analysis is one of the most effective approaches for estimating hospital burden and preparing for adequate healthcare resources

- Majority of the patients →mild case-mix group, followed by the severe and moderate groups.

- Reasons:
  - UMMC is one of the tertiary hospitals in Kuala Lumpur → complements the roles of the other public hospitals and received referrals from nearby primary healthcare facilities
  - All symptomatic and vulnerable patients were required to be admitted regardless of the stages of the COVID-19 disease
  - (A-4-13-III) was higher compared to the moderate stage → UMMC is the largest teaching hospital in Malaysia with comprehensive intensive care facilities with various clinical specialties

- Case-mix system has shown to be effective and helps to increase the efficiency and quality of hospital care

- This study is one of the important preliminary study to understand the disease burden of COVID-19 cases (based on casemix analysis) in UMMC.

- Casemix is a relevant tool to assess the workload and effeciency of care provided by the hospital with good documentation of data.

References

- Hashim JH, Adman MA, Hashim Z, Mohd Radi MF, Kwan SC. COVID-19 Epidemic in Malaysia: Epidemic Progression, Challenges, and Response. Frontiers in Public Health. 2021.

- Khalid MA. Covid-19: Malaysia experience and key lessons. Asian Econ Pap. 2021.

- Jayaraj VJ, Rampal S, Ng CW, Chong DWQ. The Epidemiology of COVID-19 in Malaysia. Lancet Reg Heal - West Pacific. 2021.

- Ganasegeran K, Ch'ng ASH, Looi I. What Is the Estimated COVID-19 Reproduction Number and the Proportion of the Population That Needs to Be Immunized to Achieve Herd Immunity in Malaysia? A Mathematical Epidemiology Synthesis. COVID. 2021.

- Azhar ZI, Chen XW, Mohamad M, Ahmad Saman MS, Isa MR, Ismail N. COVID-19 Review: An Epidemiological Perspective and Malaysian Scenario in Handling the Pandemic (January – May 2020). J Clin Heal Sci. 2020.