

113 學年度第 1 學期資訊管理研究所博士班資格考

科目:健康知識探索與管理

Time : 2024/11/01 13:00-16:00

備註：請用原子筆，勿用鉛筆作答。

Format : ☐ OPEN BOOK ☒ CLOSED BOOK

1. **(33%)** Please explain how Taiwan used medical information systems to make innovative applications during the COVID-19 pandemic?
2. **(18%)** In 2021, the World Health Organization updated and published the “Global strategy on digital health 2020-2025,” aims to improve global health care through digital technology.
  - (1) Please define and explain what is digital health(3%).
  - (2) Explain how digital health promotes universal health coverage and supports the achievement of health-related sustainable development goals. Provide examples of how digital health interventions improve specific health outcomes or strengthen health systems(15%).
3. **(15%)** The article “Knowledge management tools and mechanisms for evidence-informed decision-making in the WHO European Region a scoping review” maps existing knowledge management tools and mechanisms used to promote evidence-informed health decision-making in the WHO European Region and identify knowledge gaps. Please explain the implementation considerations for different knowledge management tools and mechanisms based on the five KM steps: knowledge generation, knowledge storage, knowledge processing, knowledge transfer, and knowledge utilization.
4. **(17%)** For the following article, published in Volume 30, Issue 4, April 2023, Pages 718–725, *Jamia*, entitled ‘MIMIC-IV on FHIR: converting a decade of in-patient data into an exchangeable, interoperable format’ and its abstract is as follows:

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Objective

Convert the Medical Information Mart for Intensive Care (MIMIC)-IV database into Health Level 7 Fast Healthcare Interoperability Resources (FHIR). Additionally, generate and publish an openly available demo of the resources, and create a FHIR Implementation Guide to support and clarify the usage of MIMIC-IV on FHIR.

Materials and Methods

FHIR profiles and terminology system of MIMIC-IV were modeled from the base FHIR R4 resources. Data and terminology were reorganized from the relational structure into FHIR according to the profiles. Resources generated were validated for conformance with the FHIR profiles. Finally, FHIR resources were published as newline delimited JSON files and the profiles were packaged into an implementation guide.

## Results

The modeling of MIMIC-IV in FHIR resulted in 25 profiles, 2 extensions, 35 ValueSets, and 34 CodeSystems. An implementation guide encompassing the FHIR modeling can be accessed at [mimic.mit.edu/fhir/mimic](http://mimic.mit.edu/fhir/mimic). The generated demo dataset contained 100 patients and over 915 000 resources. The full dataset contained 315 000 patients covering approximately 5 840 000 resources. The final datasets in NDJSON format are accessible on PhysioNet.

## Discussion

Our work highlights the challenges and benefits of generating a real-world FHIR store. The challenges arise from terminology mapping and profiling modeling decisions. The benefits come from the extensively validated openly accessible data created as a result of the modeling work.

## Conclusion

The newly created MIMIC-IV on FHIR provides one of the first accessible deidentified critical care FHIR datasets. The extensive real-world data found in MIMIC-IV on FHIR will be invaluable for research and the development of healthcare applications.

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Question 1: Since the Ministry of Health of Taiwan had decided to utilize the FHIR as the interchange vehicle of medical patient record, what is the relationship between FHIR and HL7?

Question 2: in this article, the database MIMIC-V is converted into the FHIR format. What is role of the term ‘Json’ can work for the conversion?

5. **(16%)** Suppose we have the knowledge listed in the table about the symptom and its corresponding possible causes.

Symptom	Possible cause
Fever	TB, Hepatitis (肝炎), Malaria(瘧疾)
Cough	TB, Asthma(氣喘), Bronchitis(支氣管炎), Emphysema(肺氣腫)

Question 1: Assume a patient consults with fever and cough with a doctor, what the possible causes the doctor may diagnose?

Question 2: Assume the doctor has some way or exam to exclude the possibility of TB, the possible diagnosis is null if the doctor adheres the above table. What is the possible errors to explain the situation?