SNOMED CT in *i*Pesakit

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University Malaya Medical Centre (UMMC) is situated in the South West of Kuala Lumpur, the dynamic and bustling capital city of Malaysia. In 1961, there was a shortage of medical doctors in the country hence the proposal of medical institution from the board of Education of University Malaya. Thus, the first Faculty of Medicine in Malaysia was established in 1963 followed by the official opening of the University Hospital in 1968. Fifty years on, the university hospital continues to thrive in highest quality healthcare, medical training and research in tertiary medical care, community & patient welfare services. In addition, UMMC aims to be a world renowned medical centre according to International Standards. In 2017, UMMC received over 1 million of outpatient visits and had total 55,000 hospital admission. Today, UMMC has 1128 bed with total staff just over 5000.

Due to high demand of medical services and steady growth of population in the locality especially with influx of people seeking job in the capital city of Malaysia, the university hospital had formed an ICT Task Force to upgrade the exiting computer system and also the opportunity of transforming paper medical notes into electronic medical record (EMR). Therefore, with careful evaluation of availability and the cost of medical software, it was decided to design and develop its own EMR and SNOMED CT was the chosen clinical terminology as Malaysia is one of the member countries of SNOMED CT International.

UMMC EMR (*i* Pesakit) was first introduced in the outpatient clinic in July 2014. Pesakit is a Malay word for "The Patient". SNOMED CT was used under the problem list, past histories of medical, surgery, family and social respectively. Furthermore, it has also cooperated into alert system, vital signs and final diagnosis was mapping into ICD 10.

In our first pilot study at the Department of Primary Care Medicine, the medical doctors were trained in a batch of 4. They were shown how to use the codes in each field and how to navigate in the EMR. The first consultation took slightly longer of extra 10 minutes of completing the notes. There was a brief discussion at end of each day / week to share the experience of using codes. With this exercise, not only it was useful to share information but also sharing exciting moments when the doctors managed to choose the correct codes which were previously difficult in searching. In additional, the doctors were supported by trained IT staff in case of any technical issues. Within a month of using EMR, most of 35 -40 doctors in Department of Primary Care Medicine were familiar with common SNOMED CT codes for the specialty.

Pilot project at RUKA (Primary Care Medicine Department) July- November 2014.

From our pilot study, it showed 62 % of the common SNOMED codes were frequently used in chief complaint; followed by 82 % and 68 % were SNOMED CT coded in Past History of Medical and Surgery respectively. On the other hand, senior clinicians were not able to adapt immediately with the two new transformations of electronic version and also with SNOMED CT coding. However, with the continued support and sharing experience among the colleagues, it has now become the standard for all entry in the electronic consultation notes.

For the last 3 years from 2015-2017, used of SNOMED CT coding were gradually introduced to all other specialties in outpatient clinics as well as in the wards and day care centres. During these periods, the EMR working committee had further developed e-prescribing system initially for outpatient prescriptions and towards the end of 2018, all prescribing in the hospital including in patient prescriptions were electronically generated and integrated with pharmacy's dispensing system. However, we were not able to use SNOMED CT coding in our e-prescribing system due to limited human resources, knowledge and skill in the Information Technology Department. Last but not least, the restricted time frame for us to become a "paper light" hospital, where the patient medical record in any entry should be completed electronically for the effective, efficient and safe in treatment / monitoring of the medical diseases regardless to acute or long term condition .

Use of SNOMED CT in UMMC has proven to have the following benefits:

1. The most comprehensive powerful modern clinical terminology which has a wide coverage of clinical specialties and disciplines. It includes clinical findings (symptoms and sign), procedures, observable entities, body structure, causative organisms and pharmaceutical substances and products.
2. A significant step forward from manual to electronic health record.
3. It helps to **capture** clinical information meaningfully and enable to **share** patient information within interdepartmental and across various hospitals. This has improved communication in direct patient care of sharing important relevant information.
4. By 2018, our hospital has become paper light hospital and storage of paper medical records have been reduced to a significant minimum. In addition, there is a huge saving in printing and copying costs.
5. Retrieval and analysis of clinical information by simple " click". Hence obtaining the data was much efficient with accuracy and less time consuming.
6. Lesser transcription errors in the statistically report or annual audit.
7. The data can be reused for management reporting and monitoring.
8. Epidemiology and Research into the causes and management of diseases.

Practical Uses of SNOMED CT in *i*Pesakit :

Since 2014, UMMC has adopted a mixture of free text, local existed codes and specially specific codes (SNOMED CT, ICD 10 or ICD 9 CM) at the user interface for ease and user friendly to alleviate the fear and resistance to change culture among the clinicians. The templates have been tailored

and customized to meet the requirement of departments. Therefore for each department/ discipline, a simple reference set each designed to meet a specific limited set of requirement for a shorter pick list.

Furthermore, we have an excellent EMR working committee working along the IT staff to engage and support key stake holders. In addition, being a university hospital, big data with 100 % accuracy is pivotal to research. Current projects of SNOMED CT in 2019 are:

1. Closed loop system in Pharmacy (HIV drugs)
2. Disease Registry (Nephrology) and Cancer Registry (Breast)
3. Causes of death in Mortality Record.

 As a university hospital, we have a regular annual intake of 500 house officers and 600 postgraduate doctors for master programs in the country. With a dedicated training team, all new users would have undergone training in EMR and also made aware of the importance of and how to use SNOMED CT coding. Much effort has been made to support the users, which in this case are the younger generation of medical doctors, and they will be our SNOMED CT champions where they can share their SNOMED CT experience in other hospitals or community clinics throughout Malaysia.

Challenges in Implementing SNOMED CT :

In spite of gaining popularity of SNOMED CT among the clinicians and academicians, the challenges of implementing SNOMED CT as clinical terminology in our hospital remained a pressing issue. The major areas are as below:

1. Though most comprehensive terminology rendered with the most complex of hierarchies in the structure of SNOMED CT.
2. Limited human resources with knowledge and skill in SNOMED CT.
3. Mapping of SNOMED CT to ICD 10 and ICD 9 CM for statistically reporting to Ministry of Malaysia.
4. Operating independently as the ONLY hospital in Malaysia actively uses SNOMED CT in direct patient care.