

health department



integrating icd-11 into unrwa electronic health records (e-health) system



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Cover photo: Dr. Osama Al-Haj Ali, Medical Officer at UNRWA's Main Baqa'a Health Centre in Jordan during a medical consultation to a patient. © 2020 UNRWA Photo by George Awwad

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1. Background

1.1. About UNRWA and UNRWA Health Programme

The United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) is a relief and human development agency for over 5.6 million Palestine refugees in Jordan, Syria, Lebanon, West Bank and Gaza. Since the beginning of its operations in 1950, UNRWA's primary mission has been to assist Palestine refugees to achieve their full potential in human development whilst awaiting a just solution to their plight. UNRWA's services encompass education, health care, relief and social services, camp infrastructure, microfinance, and emergency assistance.

UNRWA provides free of charge primary healthcare services, both preventive and curative, to sustain and promote the health of Palestine refugees, through 141 health centres (HCs) across the five fields of operations. UNRWA also helps Palestine refugees to access secondary and tertiary health care services. UNRWA does not operate its own hospitals (except for one, Qalqilya Hospital, in West Bank), and instead of that the Agency operates a reimbursement scheme for Palestine refugees who are registered at UNRWA HCs and receive health services (commonly called the served population or beneficiaries).

The primary health care services are provided based on the Family Health Team (FHT) approach, a life cycle-based and person-centred model focusing on the provision of comprehensive and continuity of care for the members of entire families. The health services provided include family planning, preconception care, antenatal care and postnatal follow-up, infant care (growth monitoring, medical check-ups and immunizations), school health, oral health, outpatient consultations, diagnostic radiology and laboratory services, the management of chronic non-communicable diseases (NCDs), in addition to mental health and psychosocial support.

1.2. UNRWA e-Health system

UNRWA started, in 2009, to develop an electronic health records (e-Health) system. The

primary aim for introducing the e-Health system was to improve the quality of health services, to respond to the increasing workload, and the rise in the prevalence of NCDs. The e-Health system was developed in-house, based on the Family Health Team approach, as a web-based and patient-centred digital system to support UNRWA's health services for common illnesses, maternal and child health, NCDs, laboratory and pharmacy. By the end of 2019, the e-Health system was rolled out in 137 HCs, of which 100% are paperless. The e-Health system helps to generate reports at health centre's level that can be consolidated to obtain field level and at headquarters level reports as needed. It stores the electronic health records of about 3.2 million beneficiaries, and it enables the management of around 8.7 million patient visits per year.

1.3. What are ICD-10 and ICD-11

What is ICD?

The International Classification of Diseases and Related Health Problems (ICD), is the international standard for systematic recording, reporting, analysis, interpretation and comparison of mortality and morbidity data. Currently, ICD is in the custody of the World Health Organization (WHO). Historically, there have been 10 revisions of ICD. ICD-1 was released in 1900, and ICD-10 in 1999.

ICD provides a common language that allows health professionals to record and share information on injuries, diseases and causes of death. In addition, it takes into consideration



The workflow using the e-Health system at UNRWA's Deir El- Balah Health Centre in Gaza. © UNRWA 2018
Photo by Khalil Adwan



A virtual meeting via MS Teams between UNRWA Health department staff at the Headquarters and senior staff at the Health Programmes in the five fields on several issues including ICD-11 integration into e-Health. © 2020 UNRWA Photo by George Awwad

the burden of disease, not merely mortality, and has a variety of uses including monitoring the incidence and prevalence of diseases, as well as providing safety and quality guidelines. It can be incorporated into electronic health records, in addition to its use for collecting mortality and morbidity data. It is used by physicians and other healthcare providers to classify and code all diagnoses, symptoms and procedures recorded. Since the introduction of the e-Health system to pilot HCs in 2010, UNRWA medical staff have been utilising the tenth revision of ICD (ICD-10) in their daily activities.

The current version: ICD-10

ICD-10 is the 10th revision that contains codes for diseases, signs and symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or diseases. ICD-10 is scientifically and technologically outdated and due to that it is becoming increasingly problematic. It is missing content for several de-facto uses of ICD, such as primary care and clinical decisions. Therefore, WHO's target is to have it replaced by ICD-11 on January 1st, 2022 by all countries.

The latest upcoming revision: ICD-11

ICD-11 is the 11th version of the system with numerous updates to improve the new global norm and standards for disease classifications and vital statistics. This scientifically rigorous product accurately reflects contemporary health and medical practice and represents a significant upgrade from earlier revisions.

ICD-11 codes describe the health conditions or accidents to any level of detail by combining codes. Simple coding and cluster coding of clinical details can be done. This results in the generation of data that can be used to compare mortality and morbidity data in different countries or areas at different times to design effective public health policies and measure their impact, allocate resources, improve treatment and prevention, and be used for clinical recording.

Regarding the number of codes, ICD-11 revision is almost five times as big as the ICD-10 and will officially come into effect on 1 January 2022 as mentioned above. In short, ICD11 is two great advantages: 1) a revised classification system with much more than diseases, and 2) it is in digital format.

Unlike any previous revision of ICD, ICD-11 is:

- Free for use in all countries, as a package with user guides and tools, providing inexpensive coding of patient encounters in the clinical setting.
- A flexible system which eliminates the need for local variants and allows to document all kinds of clinical details.
- Fully electronic for the first time, comprising tools and software for using the classification to generate accurate descriptions of health event information, and currently providing access to 17,000 diagnostic categories, with over 100,000

medical diagnostic index terms. The index-based search algorithm interprets more than 1.6 million terms.

- Easier to use for both low and high resource settings, leading to better data capture, and offering the tools to monitor and improve individual country's health with reduced costs (it includes all concepts for recording and reporting in primary care).
- Designed to integrate with local health information systems, ICD-11 can be used as it is with electronic health records as it ensures compatibility and interoperability with existing IT infrastructures.
- Easy to install and use online or offline.
- A data collection system which uses the Browser to generate a correct code and enables that code to be directly recorded.
- Easy to use– entering a term into the Coding Tool leads the clinician or the coder to the correct ICD code.
- Comprehensive, coming with an implementation package that includes transition tables from and to ICD-10, a translation tool (multilingual support, including in Arabic which will be helpful in UNRWA Syria Field), a coding tool, web-services, a manual, training material, and more.

The ICD-11 will replace the ICD-10 as the global standard for coding health information and causes of death. We, like all countries in the world, are using ICD-10 as standard in the e-health and need to update our knowledge and skills with ICD-11.

1.4. ICD-11 integration into UNRWA e-Health system

UNRWA e-Health is handling ICD-10 which is only incorporated at the chapter level without any specific category or subcategory of diseases and it is linked with outpatient's service only without any details or searching features. As mentioned earlier, ICD-10 is scientifically and technologically outdated. The main challenge

of the ICD-10 in e-Health system is the lack of further extension into different disease names/codes and that it does not provide any needed reports according to ICD classification. Therefore, it is difficult to monitor the health status and to allocate resources for specific areas. This also leads to poor quality clinical documentation. Consequently, it has been a priority for UNRWA to adapt ICD-11 to improve its services. A system that does not provide clinically useful information at the level of the individual health will not be rigorously implemented by clinicians and therefore cannot provide a valid basis for summary health encounter data used for decision making at the health system, national and global levels.

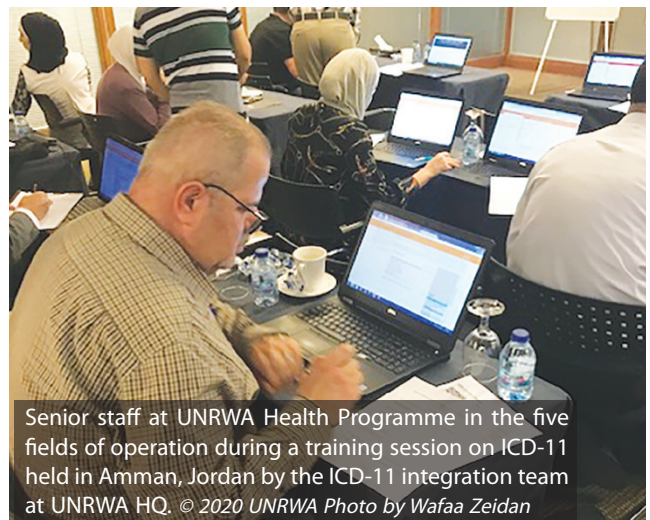
The adoption of ICD-11 is a milestone event. The development of ICD-11 has taken the commitment of many experts over more than 10 years. ICD-11 will be a useful and relevant tool for recording diseases, injuries, external cause of illness and death, patient safety events, primary care, traditional medicine, and many other components relevant for recording and reporting the health of a population.

2. UNRWA decision to integrate ICD-11 into its e-Health system

2.1. Moving towards adopting ICD-11

The transition to a new classification system (ICD-11) comes with the main challenges of limited resources and shortage of staff.

ICD-11 is a flexible system which eliminates the need for local variants and allows to



Senior staff at UNRWA Health Programme in the five fields of operation during a training session on ICD-11 held in Amman, Jordan by the ICD-11 integration team at UNRWA HQ. © 2020 UNRWA Photo by Wafaa Zeidan

document all kinds of clinical details. In such a way, and in combination with the simplified coding, it can be integrated seamlessly in the routine of clinical documentation.

ICD-11 lowers the costs for using ICD because correct use requires less training and less time for coding, and as such allows the implementation of standard reporting in places where it has not been possible to use ICD before. It is free for use in all countries, as a package with user guides and tools, providing inexpensive coding of patient encounters in the clinical setting. The ICD is also used by programme managers who track progress in global health to determine the allocation of health resources.

In January 2019, WHO Regional office organized the first workshop on the ICD-11 Orientation and Capacity Building for the Eastern Mediterranean Region (EMR) countries including UNRWA, in Luxor, Egypt. After this workshop, and based on extensive internal discussions, UNRWA health programme took the decision to adopt ICD-11 to replace ICD-10 in its e-Health system. Moreover, it was decided to keep continuous communication with WHO/ EMRO to secure its support for the training UNRWA doctors on ICD-11.

In June 2019, WHO conducted the Capacity Building Workshop of ICD-11 for 50 UNRWA medical officers from the five Fields of UNRWA operations. The main goal of this training workshop was to improve the knowledge, skills, and understanding of the participants concerning ICD-11 coding system.

2.2. UNRWA Health Information System potential for the integration of ICD-11

The UNRWA e-Health system is a web-based digital innovation that requires having only a web browser on the workstation and is supported by a centralised Information and Communication Technology (ICT) team and data storage. It was developed in-house via close cooperation between UNRWA Health Department (HD) and the Information Technology and Management Department (IMTD) at UNRWA headquarters. This in-house development has ensured that all components and source codes are owned by UNRWA. The e-Health system was included the deployment of many health information standards such as the International Classification of Diseases, 10th Edition coding system. In addition, the e-Health system generates reports at different levels to enable the monitoring of services effectively and to support the management in making informed decisions and plans.

For the integration of ICD-11 within the UNRWA e-Health system, a new version of e-Health has been developed in order to link every outpatient visit with its correct ICD-11 code which will facilitate the mission in verifying symptoms and diagnosis as well as recording the correct and unified description for each case. This will result in fewer mistakes and will allow for more detailed clinical recordings.

2.3. Expected benefits of ICD-11 integration

There are a range of benefits that UNRWA expects to gain from ICD-11 integration in the e-Health system. Firstly, the integration



Dr. Mohammad Al-Farra, Head of UNRWA's North Shouneh Health Centre in Jordan during a medical consultation to a patient. © 2020 UNRWA Photo by George Awwad

of ICD-11 will support UNRWA e-Health in giving more accurate diagnosis /symptoms in a specific manner which is compatible with ICD-11 codes. Secondly, ICD-11 will serve multiple purposes, including use for mortality and morbidity statistics, clinical use in primary care, specialty care and research.

ICD-11 will also improve statistical & transactional reporting, facilitate information sharing and comparison of health information between regions, countries, and other settings, as well as data comparisons in the same location across different time periods. Lastly, it will improve the quality of data related to diagnoses and symptoms.

The effective deployment of ICD-11 is expected to facilitate the use and collection of health information will therefore facilitate quantitatively informed decisions at all levels within UNRWA health system.

3. UNRWA Road Map for ICD-11 integration into e-Health system

Step 1 Establishing a taskforce for ICD-11 integration for the project management and strategic planning

A taskforce was established which consisted of staff from the HD and IMTD at UNRWA headquarters. Establishing a taskforce was essential to provide technical advice, guidance, support, and to define the timeline for the expected work all over the course of the project.

This team was mainly responsible for:

- a. Careful and inclusive project planning and oversight for determining readiness and priority-setting following self-assessment.
- b. The preparation of a strategic plan that includes all standard and necessary elements.

Step 2 Creating a dedicated project for integrating ICD-11 into the e-Health system

- a. Evaluation, including self-assessment, of the e-Health system

An evaluation of the current e-health system was made to ensure the integration would be needed, would be suitable to the end-users

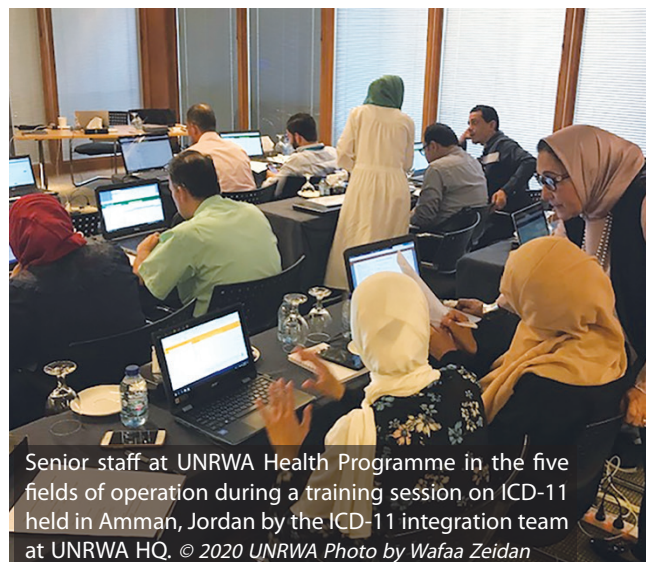
and technically feasible. Major activities at this stage included:

- Identifying what and how much is necessary to progress, identify potential obstacles and to inform a “before and after” analysis.
- Analysing the current information technology infrastructure
- Preparing the business requirements and system design documents
- Maintaining the current classification (ICD-10) for a defined period
- Deciding the scope for the integration (decided to start with the outpatient e-health module).
- API software development, integration, and testing.
- Determining new features that need to be added into e-Health system.

b. Preparation of the business requirements and system design documents.

We defined the business and system design requirements through the following steps:

- Interviewing the focal points of e-health and discussing the new parameters with them.
- Conducting meetings for modifying the new design and approval based on the user needs.
- Developing a prototype according to the agreed business requirements available and ensure end user’s acceptance.



Senior staff at UNRWA Health Programme in the five fields of operation during a training session on ICD-11 held in Amman, Jordan by the ICD-11 integration team at UNRWA HQ. © 2020 UNRWA Photo by Wafaa Zeidan

- Validating the information and offering feedback/corrections from the e-health focal points and the health department at headquarters.

c. Specifying the scope for the integration.

The e-health system supports UNRWA's health services through several modules including outpatients (common illnesses), non-communicable diseases, maternal health care, infant and child health care, dental services, mental health and psychosocial services, in addition to laboratory and pharmacy modules. The integration of ICD-11 started from the outpatients' module (common illnesses). The outpatients' module was chosen as it covers the most common illnesses that are included in the 26 chapters of ICD-11. The proposed outpatient module "main consultation" will contain the main parameters that are required to allow medical officers to perform their work and use new functions. This includes chief complaint/signs and symptoms / medical examination and diagnosis/ reason(s) for the consultation, which need to be translated into standard codes in ICD-11.

d. Integrating e-health with ICD-11 through WHO API's

UNRWA utilizes the docker container technology, created by WHO, and uses Application Programming Interface (API) that allows e-health to read all needed data elements which will be used by e-health to allow users to get all needed classifications. Through using this integration, UNRWA guarantees that the access to the latest updates on all ICD-11 classifications through WHO servers.

e. New features added into e-health system

E-health became fully integrated with ICD-11 and we have introduced interactive design through User experience (UX) design which transformed outpatients' module and other screens into an interactive and responsive design as well as improved the workflow for the main consultation.

The new design of the main consultation screen will be composed of 4 steps:

- Initial assessment (nurse assessment) related to vital signs is performed routinely in all UNRWA health centers by nurses based on the request by the medical officer.
- Complaints: Chief complaints / signs & symptoms / medical examination is performed by the medical officer.
- Diagnosis is performed by the medical officer.
- Medicines prescription is performed by the medical officer.

This new design is very user friendly allowing the end user to easily utilize the system. It creates a 4-step workflow instead of one big page and makes it more organized to save doctors' time in dealing with the system. Additional features were added to this functionality:

- Feature 1 - Chronic known condition: This feature will be associated with the patient profile in each outpatient visit and will help the physicians to understand patient medication. This includes details of the purpose of the medication, any special instructions and potential side effects.



A medical doctor at one of the health centres in Gaza offering a medical consultation to a patient. © 2020 UNRWA Photo by Khalil Adwan

- Feature 2 - Search for chief complaint: Through this feature, the ICD-11 code, and the standard description of the complaints (symptoms and signs) can be obtained from WHO API's into the e-health system.
- Feature 3 - Type of visit: There are two types of visits (New visit /Follow up visit). This feature helps the doctor to know about the patient's past medical history and their current medical conditions and/or ailments for follow-up visits. The feature of follow-up records the patients' chronic health conditions, how many times the patient receives treatment for the same condition, and whether a new visit may occur. This feature will be helpful in conducting routine analysis and monitoring the incidence and prevalence of diseases through reports.
- Feature 4 - Last Outpatient visits: This will help the doctors to see all patient's visits history from the same main consultation screen with less time.
- Feature 5 - Search for diagnosis/reason for encounter: Through this feature, the ICD-11 code, and the standard description of the diagnosis/ reasons for encounter that can be obtained from WHO API's into the e-health system
- Feature 6- Advice needed for taking medications: The doctors will activate this feature on the Medicines screen for the critical patients' conditions who need more health advice about their medications. This will appear as an alert on the screen of the pharmacist when dispensing medications to these patients.

Step 3 The integration of ICD-11 into the e-Health and the development of the new user interface design (UI) / user experience design (UX)

- a. IT team developed all requested changes according to the agreed requirements/design.
- b. The newly developed system was tested and fine-tuned.
- c. User acceptance testing (UAT) & quality assurance measures were done using the PDCA (plan, do, check, action) cycle to conduct validation and to fix errors.

- d. Quality assurance testing is to ensure that ICD-11 is working properly without bugs and meets specified requirements in the test plan derived from the agreed scope of work. This involves:
 - Development and testing of processes in several scenarios through PDCA cycle.
 - Checking, monitoring, and modifying the processes and checking whether ICD-11 meets the users' needs.
 - Adding data validation to improve the quality of data.
 - Adding a search tool to follow up and monitor the data entry in the first stage.
 - Implementing actions that are necessary to achieve improvements in the processes.

Step 4 Piloting ICD-11 within outpatient module in the e-health system

The ICD-11 project and user experience (UX) design within the outpatient module was piloted.

This required the creation of a test environment link to be able to practice the e-health new outpatient medical consultation using ICD-11 coding. The testing occurred through the test environment link and was conducted by the e-health focal points from each field as well as the UNRWA health department at the headquarters.

Step 5 Training of Medical Officers (MOs)

a. Face-to-face training

A course was designed for UNRWA medical officers to build their capacity in order to facilitate the coding of diseases in the e-health. The course was then delivered in the first week of March 2020 in cooperation with WHO in Jordan field. More than 70 medical officers attended the training course.

b. Online training

Due to the COVID-19 situation, UNRWA could not continue the face-to-face training with the medical officers from other fields. Therefore, UNRWA adopted an alternative plan and developed an e-learning course on the UNRWA Moodle Platform with the assistance from IMTD. This e-learning course would help the medical officers to facilitate e-learning via the intranet by using the uPerform tool to simulate the practice of health services transactions before they do "real" transactions in the e-health system. The

ICD-11 e-learning course was then piloted from the 11th of July to 16th of July in the five fields for 78 medical officers who completed the course and successfully got the certificate. Their feedback on the course structure was incorporated into the final version.

The ICD-11 e-learning course consists of the main four modules, in addition to a supplementary module which includes additional resources as PowerPoint presentations.

- Module One: Course Introduction
- Module Two: The process to complete the “e-Health Outpatient-Module”
- Module Three: Practice on the Morbidity Coding
- Module Four: Practice on the Morbidity Coding Rules
- Supplementary Module: Additional resources.

By the end of August, all medical officers in all five fields will complete the e-learning course. All medical officers should have Moodle access, so they can log into the Moodle by using their UNRWA username and password and select self-enrollment. Medical officers who do not have UNRWA email addresses can use their employee number for username and password. We are now in discussions with the Human Resources Department and IMTD in regard to how to create standard operating procedures (SOP) of the medical officers before the recruitment and selection process. This will allow them to access and log into the ICD-11 e-learning course in Moodle to get the certificate before joining the health centers, in order to enable them to work smoothly on ICD-11 coding through the e-health system.

c. Providing local testing environment for the medical officers to practice

At the end of this course, once medical officers are confident that they have mastered the course content, they need to complete the course exam. They are required to achieve a minimum score of 80% to obtain the course certificate. Course Evaluation was designed to receive the trainees' views for the improvement of ICD-11 online training course. The trainees were encouraged to provide honest and constructive comments.

Step 6 Launching the ICD-11 integration into the e-health system

On the 1st of September, ICD-11 will be launched in the e-health system and will be ready for the real-life practice.

4.Way forward and the next steps

It is planned that on the 1st of September 2020, all doctors at UNRWA health centres in the five Fields will be using the ICD-11 in providing consultations to outpatients. The use of ICD-11 will be continuously improved based on the continuous monitoring and evaluation by UNRWA HD and IMTD at the headquarters. ICD-11 will allow UNRWA to create general reports which were not possible under ICD-10 in the e-health. The reports will allow UNRWA to have a better overview of the health status of Palestine refugees and how to improve UNRWA health services.

There are several actions that will be taken as next steps to this stage, and they include the following:

1. Create general reports which were not possible currently under ICD-10 in the e-health.
2. Integrate ICD-11 into other modules.
3. Integrate an Arabic version of the ICD-11 in e-health to facilitate the system usage for doctors who are more comfortable with Arabic, especially in Syria where the medical education/training in the country is in Arabic.
4. Integrate ICHI (international classification of health interventions) within the e-Health system.
5. Keep introducing continuous improvements to the system based on the on-going monitoring and evaluation processes.



Senior staff at UNRWA Health Programme in the five fields of operation during a training session on ICD-11 held in Amman, Jordan by the ICD-11 integration team at UNRWA HQ. © 2020 UNRWA Photo by Wafaa Zeidan



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