2015 clinical audit of diabetes care among Palestine refugees

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Foreword – Dr. A Seita

It is my great pleasure to present the 2015 clinical audit of diabetes care in UNRWA health centres. This report is a summary of the hard work completed by medical providers at health centres, field offices and headquarters. In 2015, UNRWA conducted the second clinical audit to assess the situation and progress in diabetes care since the first audit of 2012. Diabetes remains an important health problem among Palestine refugees, and the prevalence of diabetes has continuously been increasing: by 3-5% every year. In 2014, a total of 127,806 diabetic patients were registered in UNRWA five Fields (Gaza Strip, Jordan, Lebanon, West Bank and Syria).

The financial pressure to maintain and expand diabetes care is significant. Insulin alone, for example, accounts for 15% of the budget for medicines.

This clinical audit is very important. The 2012 audit was the first extensive assessment of UNRWA diabetes care in recent years. The audit is a result of collaboration with the World Diabetes Foundation and international diabetes care experts. The audit results provide priceless lessons to further improve UNRWA diabetes care.

Medical officers caring for diabetes patients follow UNRWA's diabetes Technical Instructions properly and have adequate knowledge and understanding. The first and second audit found two critical issues. One is the importance of introducing HbA1c testing, the global standard for measuring diabetes control status. UNRWA has not yet introduced this testing because of budget constraints. However, the first and second audit results highlight the limitations of the current testing of 2-hr postprandial glucose (2-hr PPG). The other critical issue is the urgent need to promote a healthier lifestyle. The vast majority of diabetes patients were either obese or overweight. Without a healthier lifestyle, diabetes cannot be properly controlled. UNRWA will continue to work to address these challenges in diabetes care.

I would like to express my sincere appreciation to all the partners for their immense support, in particular the World Diabetes Foundation (WDF) and the Managing Director, Dr. A Kapur. I would also like to thank Prof. J Nerup (Dan Church Aid, Denmark), Dr. T Nasser and Mr. A Abu Halaweh (Augusta Victoria Hospital, East Jerusalem), Prof. K Ajlouni and Dr. M Khateeb (National Diabetes and Endocrinology Centre, Jordan) and Dr. F Riccardo (Italy). The work done by UNRWA staff, particularly Chief Disease Prevention and Control and Field Disease Control Officers, was truly invaluable. I appreciate all the contributions and hard work.

We are expanding the Family Health Team (FHT) approach with e-health as part of UNRWA health reform. The clinical audit on diabetes care is an important milestone of our reform.

Dr. A. Seita
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Executive Summary

Back ground

UNRWA conducted the first clinical audit for the diabetes care in 2012. UNRWA has been providing diabetes and hypertension care in its health centres since 1992. Diabetes care includes screening of high-risk groups, diagnosis and treatment. Treatment includes promoting a healthy lifestyle and medical assistance such as insulin therapy. In addition, UNRWA invests in primary and secondary prevention.

The first audit in 2012 aimed to acquire evidence- based information on the quality of diabetes care, define a strategy to improve technical and managerial capacity within UNRWA's health service, and increase diabetes awareness among Palestine refugees. It collected data and Identified the training needs of health staff in diabetes care.

It validated the general UNRWA approach and confirmed its capacity to manage diabetes care in a primary health care setting. At the same time, it conducted an in depth assessment of NCD care, documenting strengths of UNRWA diabetes care, and some critical shortcomings that will help identify priorities for further improvement.

The availability of competent health staff and of updated, scientifically documented protocols (Technical Instructions) are the main strengths of diabetes care in UNRWA health centers. The clinical audit confirmed that UNRWA medical providers working in diabetes care follow the Technical Instructions rigorously.

Control rate as identified through HbA1c tests is lower than that measured using the currently applied method of 2-hr PPG (28% vs. 45%). Estimating diabetes control through 2-hr PPG is misleading as it over-estimates control rates. Using HbA1c tests, control rates among UNRWA diabetes patients were found to be low. Improvement is needed for UNRWA diabetes care to be more effective.
More than 90% of UNRWA diabetic patients are either obese (64%) or overweight (26.3%). Reducing the prevalence of patients who are overweight or obese is a priority for UNRWA. Lifestyle support activities need to be strengthened.

In 2015, UNRWA conducted the second clinical audit to assess the situation and progress in diabetes care since the first audit. Diabetes remains an important health problem among Palestine refugees, and the prevalence of diabetes has continuously been increasing: in 2014, a total of 127,806 diabetic patients were registered in UNRWA five Fields (Gaza Strip, Jordan, Lebanon, West Bank and Syria).

Objective and Methodology

The main objectives of the second clinical audit are to acquire the evidence-based information on quality of diabetes care, and assess and follow up the progress since the first audit in 2012. Several activities were implemented as a result of the first clinical audit including screening programs, education sessions for patients, physician training and diabetes health promotion campaigns – by comparing audit results from 2012 to the newly published results here, this report will seek to evaluate the impacts of these new activities in the 3 years since they have been implemented.
The audit was, as in its 1st round, scheduled to cover all five UNRWA Fields. However, Syria could not be included due to the ongoing conflict, and the clinical audit covered the Gaza, Jordan, Lebanon and the West Bank.

The second audit followed the same methodology of the first audit. The sample size is a total of 1,600 diabetic patients from 32 of the largest UNRWA health centres (8 clinics in each Field with 50 patients at each clinic). Patients were interviewed and examined according to a WDF-UNRWA data collection procedure that included questions on past medical history, current findings, laboratory tests, clinical management and diabetes complications. Blood samples were collected and tested for HbA1c at Augusta Victoria Hospital in East Jerusalem. Data was entered and analysed with Epi-info 2000. Patients provided informed written consent.

The medical officers at UNRWA health centers, caring for diabetes patients, were also assessed, like in the first audit. The same questionnaire was distributed to 65 medical officers before the start of the clinical audit to assess medical officers' knowledge of the different aspects of diabetes care such as demographic characteristics of patients, the prevalence of risk factors, correct clinical management and follow up of diabetic patients.

Results

A total of 1,600 patients were enrolled in the second audit. Profiles of these patients differed little from those of the first audit. They tend to be older than they were in the first audit; 44.4% were 60 years and above compared to only 42.8% in the first audit, with a mean age of 57.1 years compared to 56.6 years, and with longer duration of diabetes care of 8.5 years mean duration of care compared to 7.2 years in the first audit, with 11.8% had duration of care of 15 years or more compared to 6.4% in the first audit, and only 37.3% had duration of less than 5 years, compared to 43% in the first audit.

Fifty seven (3.6%) were affected by type 1 diabetes compared to 4.3% before, and 1,543 (96.4%) by type 2 diabetes. A high proportion of patients (1,155 or 72.2%) have comorbidity with hypertension, which was only 68.9% in the first audit. The majority of patients (1,032 or 64.5%) were females, which is a reflection of the general patient populations at UNRWA health centers. Obesity was also similar to the first audit, it was highly prevalent: 1,053 (65.7%) were obese and 401 (25.1%) were overweight. There were 332 (20.8%) smokers.

Clinical management of diabetes was found largely in line with UNRWA Technical Instructions (TIs) on diabetes care, as observed in the first audit. Of 1,600 patients, 42 (2.6%) received lifestyle support only, 1,536 (96%) received diabetes medicines and 22 (1.4%) received treatment from non-UNRWA health facilities. Of those who received medicines, the majority (1,062 or 66.4%) received OHA only, followed by combined therapy of OHA and insulin (340 or 21.3% compared to 14.4% in the first audit), and insulin alone (156 or 9.8% compared to 12.9% in the first audit). Diabetes monitoring examinations are routinely done. Two-hour postprandial glucose, cholesterol, creatinine and urine protein tests were regularly completed for patients (95.9%, 97.5%, 98.0% and 91.7%, respectively).

The knowledge of the 65 medical officers on diabetes care revealed good, in line with TIs, as shown in the 1st audit. About 90% have correct knowledge of frequency of patient follow up as well as laboratory tests for cholesterol and creatinine. More than 70% of medical officers have a correct understanding of proper use of insulin.

Control rates of diabetes - based on the current criteria with 2-hr postprandial blood glucose (2-h PPG) testing – were between 45 to 55% which falls in the TI targets. Of 1,600 patients, 804 (50.3%) have 2h-PPG equal or less than 180mg/dl. This proportion is 45.6% among patients with type I diabetes, 54.1% with type 2 diabetes only, and 49.2% with type II diabetes and hypertension. However, such control rates became quite different – in reality much lower - when the HbA1c testing was used instead of 2h-PPG: see below.

Late complications were found in 344 patients (21.5% of all) compared to 9.3% in the first audit: 275 (17.2%) with myocardial infarction, 60 (3.8%) with cerebral stroke, 5 (0.3%) with total blindness, 2 (0.1%) with above- ankle amputation and 2 (0.1%) with end-stage renal disease. Peripheral neuropathy was the most common early complication (484 or 30.2%). Among all patients assessed during this audit, 558 (34.9%) reported one or more episodes of hypoglycemia during the previous year. The prevalence of elevated creatinine value of more than 1.2 mg/dl increased from 6.4% in the first to 9.8% in the second audit.

The second audit showed a number of good progresses in diabetes care in comparison with the first audit in 2012. Provision of health education improved considerably. In the first audit, only 22.6% of patients received 4 or more health education sessions. This proportion improved to 56% in the second audit. All patients received at least 1 education session in the second audit. The second audit also shows a slight increase of funduscopic examinations for diabetic patients since the first audit. It also showed that UNRWA became the source of lipid lowering agents for 64.4% of patients compared to only 12.4% in the first audit.

The second audit also showed that the standards of diabetes care, defined in the technical instructions, have in principle been continuously and rigorously followed. Care and treatment patterns are along with the technical

instructions follow up examinations like 2-h PPG, cholesterol and creatinine tests were conducted regularly. Self - monitoring through the use of glucometers increased by 4% between audits. UNRWA's extensive experience in diabetes care in primary health care settings and the capacity, experience and rigour of their medical providers are a solid foundation on which to improve diabetes care.

At the same time, the main shortcomings identified in the first clinical audit remained the same. Firstly, the control rate based on the HbA1c tests (i.e. <7%) is as low as 25.2%. It was 5.3% for type I patients, 28.3% for Type II patients and 25.0% for patients with diabetes and hypertension. Secondary, the lifestyle issues remain predominant. More than 90% of patients are either obese (65.8%) or overweight (25.1%). Among female patients, the proportion is much higher at almost 94.2%, of which 74.1% are obese. Eye exams, which were supposed to be conducted every year for all patients, were conducted only 49.2% of the patients.

Conclusions

The repeated clinical audits on diabetes care were found very informative and effective in analyzing the care of diabetes which is the major health problem among Palestine Refugees. The second audit showed a number of improvements and maintenance of good diabetes care at UNRWA health centers. Health education was provided more frequently to patients, and the technical instructions on treatment and monitoring of diabetes patients were regularly followed. As indicated in the first audit, the availability of competent medical providers and updated sound protocols (technical instructions) are the main strengths of the diabetes care in UNRWA. Medical officers have appropriate knowledge of diabetes care and are able to provide treatments.

At the same time, the problems identified in the first audit, namely low control rates, poor health lifestyle remained the major problem in diabetes care in UNRWA. Control rates are around 25% only, without improvement since the first audit. Obesity, the major risk factors in diabetes, remained prevalent: 90.9% of patients were either obese or overweight. Addressing such fundamental issues is critical for the future success of diabetes care in UNRWA and for Palestine refugees. Along with the UNRWA's health reform based on the person-centered family health team, such issues need to be addressed comprehensively and continuously.

The second clinical audit showed that the study population were older, with longer duration of diabetes care, more patients with both diabetes and hypertension, and more prevalence of late complications. This population usually have more frequent visits to health centers based on UNRWA technical instructions that patients with poor control should see the doctor and visit the health center monthly, while those with good control visit quarterly. This may result that patients with poor control have higher probability of being selected in this study, and hence the lower control rate and higher rates of late complications found in the second audit compared to the first audit results.

Action points

The second clinical audit results indicate two urgent strategic points to address. One is an urgent need to introduce HbA1c testing widely and update the technical instructions accordingly, so as to measure the blood sugar more accurately. The traditional 2-h PPG tests were found not effective. The second is to have comprehensive long-term intervention for healthy lifestyle promotion among Palestine refugees. Such extremely high prevalence of obesity – although it is among diabetes patients and not among ordinary, non-diabetes populations – gives strong warning about continued rise of diabetes among Palestine refugees. On top of the maintenance of the good progress and performance in UNRWA's diabetes care, such urgent actions are much needed.

Accordingly the action points recommended to UNRWA are as follows:
- Develop comprehensive healthy lifestyle promotion strategy addressing all aspects on risk factors (diet, exercise and smoking) comprehensively & strategically, based on evidence, during the course of 2016, so as to implement the strategy by end 2016.
- Improve diabetes monitoring mechanisms through introduction of HbA1c testing and updating the technical instructions during the course of 2016.
- Comprehensive prevention activities for populations at risk of diabetes and other comorbidities: expansion of partnerships with local, national and international stakeholders.
- Strengthen staff capacity development in all areas, including nurses and other paramedical staff. Focus on proactive diabetes care delivery for health promotion, education and adherence. This may require redefining roles and duties.

1. Introduction

The United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) has been serving Palestine refugees for over 65 years – including providing comprehensive primary health care services. Over the course of these 65 years, there has been an epidemiological shift in disease burden towards non-communicable diseases (NCDs), including diabetes, cardiovascular disease and cancer. The increasing burden of NCDs has been propelled by the high prevalence of behavioural risk factors such as unhealthy diets, physical inactivity, and smoking, while the rates of infectious disease have inversely declined.

The following report will focus on the state of diabetes care delivered by UNRWA to Palestine refugees. This clinical diabetes audit is a follow-up report to the first clinical diabetes audit which was performed in 2012. Several activities were implemented as a result of the first clinical audit including screening programs, education sessions for patients, physician training and diabetes health promotion campaigns – by comparing audit results from 2012 to the newly published results here, this report will seek to evaluate the impacts of these new activities in the 3 years since they have been implemented.

Diabetes is a major health problem among Palestine refugees, and as such has been an UNRWA priority for nearly three decades. Diabetes and hypertension care have been provided at UNWRA clinics since 1992; the organizational NCD strategy has been revised four times – most recently in 2009 and is currently under revision. Additional information regarding UNRWA's primary health care and NCD strategies specific to diabetes can be found in the first clinical audit report or on the UNRWA website.

Prevalence of diabetes among the Palestine refugee population has been increasing steadily over recent history. By 2014, 127,806 patients with diabetes were cared for at UNRWA health centres – an increase of nearly 13,000 from the 113,911 patients with diabetes that were cared for in 2011 at the time of the last audit.
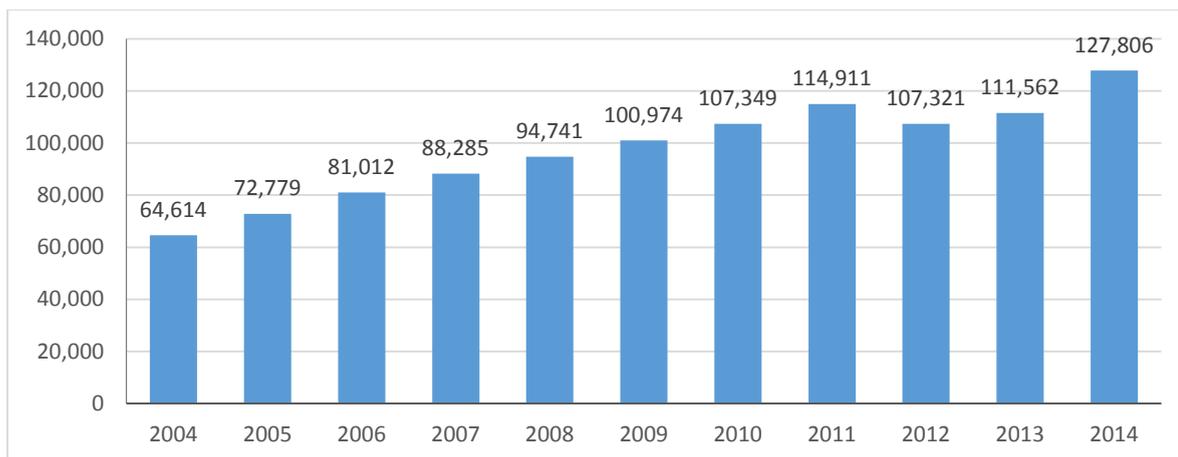
Figure 1 – Number of diabetes patients under UNRWA care (2006-2014)

*Note: 2012, 2013 data does not include diabetes patients under UNRWA care in Syria due to the conflict occurring there.

2. Objectives

The objective of this follow-up clinical audit was to acquire evidence-based information on the quality of diabetes care provided by UNRWA. Furthermore, the report sought to determine the impacts of activities which were implemented as a result of the first clinical audit in 2012; such activities include diabetes screening, physician training, patient education, and public health awareness campaigns. The audit sought to evaluate diabetes in all five fields served by UNRWA (Gaza Strip, West Bank, Jordan, Lebanon and Syria). However, it was not possible to include Syria in the first and follow-up clinical audits due to the ongoing conflict in that country.

The findings of this follow-up audit will be compared to the previous audit completed in 2011, and will be used to define and improve strategies related to the technical and managerial capacity within UNRWA's health service, and will be used to increase diabetes awareness among Palestine refugees.

Specifically, the objectives of the follow-up audit were to:

- Examine UNRWA health care services provided to diabetic patients
- Collect data on process, outcome, and treatment indicators to establish baseline and current status
- Identify areas and means to improve the quality of clinical care provided at health centre level
- Identify the training needs of health staff in diabetes care
- Assess and evaluate the impact, on diabetes care and management, of activities which were implemented as a result of the first clinical audit

3. Methodology

The second audit used the same methodology of that of 2012, it focused on two areas. The first step was to assess the quality of health services provided to DM patients. The second step assessed UNRWA medical officer DM care by evaluating knowledge, attitude and practice, as well as perceptions about patients and services.

3.1 UNRWA health centres quality of DM care

3.1.1 Study type

Cross-sectional study.

3.1.2 Study population

There were 127,806 diabetic patients receiving care in UNRWA health centres during 2014.

3.1.3 Sampling method and size

This second clinical diabetes audit followed the same sampling methodology as the first – adhering to joint UNRWA and World Diabetes Foundation (WDF) expert recommendations. A convenience sample of 50 patients from each health centre was selected – the first 50 patients visiting a health centre who met inclusion criteria were recruited. A questionnaire was completed for each patient during a comprehensive clinical examination which included patient interview and records review.

The 8 largest health centres in each field were pre-selected to be included in the study – giving a total of 400 patients per field, resulting in a grand total of 1600 study participants. As was the case in the first audit, the Syria field was unable to participate in the audit due to the ongoing conflict.

3.1.4 Inclusion criteria

The following criteria were considered for patient enrolment:

- Patients visiting the clinic on assessment day with confirmed diabetes mellitus and/or DM and hypertension (DM/HTN) who had received care at UNRWA NCD clinics for at least one year.
- Patients who were willing to participate accepted HbA1c testing and signed a consent form.

3.1.5 Data collection methods

The main audit tools were provided by the WDF, revised during expert meetings and adapted to UNRWA guidelines and procedures. The tools included two structured questionnaires, including a patient data collection form and a review of medical officer Knowledge, Attitudes and Practice (KAP).

The patient data collection form included socio-demographic data, DM type, risk factors, weight/height/waist measurements, blood pressure, prior year medical records, complications, current medications, self-monitoring and health education.

The questionnaire was completed in the patient's presence. To ensure proper assessment, the following procedures were followed:

- During audit day, first 50 DM patients meeting inclusion criteria at the enrolled health centres were included.
- Patients were informed about participation at interview and examination, and informed consent was obtained via signing of a consent form.
- To ensure privacy, two rooms within each health centre were prepared for the examination.
- The following equipment and instruments were made available:
    o Adult scale for weight measurement
    o Stadiometer for height measurement
    o 1.5 metre tape measure for waist measurement
    o Standardized blood pressure machine
    o Stethoscope
    o Tuning fork
    o Sterile needles for sensation evaluation
    o Dry cotton
    o Alcohol cotton balls
    o EDTA tubes, sterile syringes and alcohol swabs

Each of the Chief Disease Prevention and Control Officer (CDP&C) from HQ in Amman and the Field Disease Control Officer examined 25 patients from each health centre. Either a staff nurse or a trained NCD nurse assisted with the examination. A laboratory technician drew blood samples from the patients, and was charged with appropriate storage of samples until testing.

3.2 Health centre DM care assessment

3.2.1 Study type

Cross sectional study

3.2.2 Study population (3.1.2)

In total 65 medical officers provided DM care in 32 participating health centers completed the questionnaires.

3.2.3 Data collection instrument

A questionnaire was developed and distributed to the medical officers prior to the start of the clinical audit in each health center. The questionnaire analysed the medical officers' knowledge of the different aspects of diabetes care such as patient demographics, risk factors, treatment and monitoring of diabetes (Annex 2)

3.3   Audit Pilot

 As this was the second survey, there was no need for piloting.

3.4 Setting

The same 8 largest health centres of the 2012 audit in each of the four participating fields were selected to conduct the clinical audit. However, in 2015 Rashideh Health Centre in Lebanon was chosen in place of Naher Al Bared Health Centre because of prevailing emergency conditions at the Naher Al Bared Health Centre during the time of audit.

Table 1: Clinical audit health centres

Gaza	West Bank	Jordan	Lebanon
Beach	Al Jaber	Amir Hassan Quarter	Borj Al Barajneh
Jabalia	Ama'ry	Amman New Camp	Beddawi
Khan-Younis	Arroub	Amman Town	Beirut Poly Clinic
Ma'en	Balata	Baqa'a	Eean Al Hilweh 1
Nuseirat	Camp No. 1	Irbid	Eaan Al Hilweh 2
Rafah	Hebron	Jabal El-Hussein	El Buss
Rimal	Jenin	Nuzha	Rashideh, (replaced Naher Al Bared)
Zaitoun	Tulkarem	Zarka	Saida Polyclinic

3.5 Time frame

The following timeframe was followed:

- March 2015: West Bank field data collection
- April 2015: Jordan field data collection
- May 2015: Gaza Strip field data collection
- June 2015: Lebanon field data collection
- July 2015 to September 2015: Data entry/analysis
- September 2015 to December 2015: Report writing

3.6   Ethical considerations

Patients were informed that inclusion in the study was voluntary and that refusal to participate would in no way affect their care. Patients were not placed under any pressure to sign the informed consent form. All procedures ensured participant confidentiality and no names were included. All processing of samples and records ensure confidentiality

3.6 HbA1c testing

Although considered to be the global standard for assessment of diabetes control, the HbA1c test is not used in UNRWA health centres due to prevailing financial constraints. However, UNRWA is planning the introduction of HbA1c testing in 2016.

Current diabetes monitoring protocol indicates the 2-hour post-prandial glucose (2hr PPG) test to be used across health centres. However, to acquire useful information on diabetes control rates and to assess current protocol, the HbA1c test was also conducted for all study participants. A cut-off of 7% was for the HbA1c test to establish whether the diabetes was controlled – based on the criteria of the International Diabetes Foundation and the American Diabetes Foundation.

Same like 2012 audit, samples were collected from all participating patients for HbA1c testing. Blood sample collection was performed according to the following procedures:

- Blood samples for each patient were collected in two vacutainer vials (EDTA tubes of 13x75mm size). Each samples was at least 1mL of well-mixed, whole blood.
- Patient ID numbers were included on the blood and the rack. No names were used in the report or communicated to others. Confidentiality and ethical considerations were a priority throughout the process.
- All blood samples were labelled with patient sample numbers and kept under cold chain conditions until they arrived to the Augusta Victoria Laboratory for testing.
- To confirm results and for UNRWA staff capacity building, 100 samples from each of Jordan (Baqa'a and Irbid health centres) and Lebanon (Beirut and Saida Polyclinic health centres) were also double-tested at UNRWA laboratories in Jordan at the Baqa'a Health Centre laboratory). Furthermore, 100 samples from the Gaza Strip (Rimal and Jabalia health centres) and 100 from the West Bank (Hebron and Arroub health centres) were also double-tested at UNWRA laboratories at the Shams health centre in the West Bank.
- The second set of test tubes was kept frozen in each field until the first set was processed at Augusta Victoria Hospital and results were communicated to UNRWA HQ in Amman. If no longer needed, the reserve tubes were discarded according to UNRWA disposal procedures.

3.7 Indicators

The following indicators are examples of those measured during the audit:

Table Example Indicators

	Process	Outcome
1	Number and percentage of patients with 2-hr PPG measured	Number and percentage of patients with controlled glycaemia according to UNRWA criteria
2	Number and percentage of patients with total blood cholesterol measured annually	Number of patients with acceptable cholesterol level (below 200mg/dl)
3	Number and percentage of patients whose blood pressure was measured	Control rate among patients according to blood pressure (equal to or below 140/90)
4	Number of patients who received annual fun- doscopic exams	Percentage of patients with diabetic retinopathy – reported by the ophthalmologist
5	Number and percentage of patients who had annual diabetic foot exams on both feet	Percentage of patients affected by diabetic foot
6	Number of annual health education sessions (individual and/or group counselling by medical provider)	Number and percentage of patients who receive at least one annual health education session
7	Insulin injections administered	Percentage of patients on insulin therapy

3.8   Data handling and statistical analysis

Data collection and entry was completed by the CDP&C Officer and the Field Disease Control Officers of each field using Microsoft Excel. Data collection and entry was completed by June 2015. Data cleaning, sorting and analysis was performed at HQ in Amman by the Health Statistics Officer and a Medical Intern and was completed by September 2015. Data analysis was conducted using Microsoft Office Excel 2013, Epi-Info 7 and SPSS 13.5 statistical software.

All data was tabulated and presented, where sub-groupings were made according to health centre, location, disease duration, treatment type, HbA1c levels and other relevant variables. The response rate to all the variables assessed was presented as percentage and numbers; mean, average, and standard deviation of quantitative data was calculated.

4 Standards

The main objective of the first audit was to evaluate diabetes care provided in UNRWA health centres following UNRWA guidelines, while this follow-up audit aimed to evaluate diabetes care and the impacts of activities such as training and education sessions implemented as a result of the first audit. The clinical audit assessed the clinical management and service performance against the latest UNRWA Technical Instructions (Technical Instructions and Management Protocol on Prevention and Control of Non-Communicable Diseases, 2009).

This follow-up report followed the same standards and procedures as the first audit. Detailed information on the Technical Instructions (TIs) on non-communicable diseases can be found in the first diabetes clinical audit report or online. The first two chapters of the TIs on General Prevention and Diabetic Patients are considered relevant to this report.

Table 3 - NCD Prevention and Control

NCD Prevention and Control	Diabetic Patients
Burden Prevention Interventio n Strategy Organization Duties and Responsibilities Recording and Reporting Evaluation	Definition Classifica tion Diagnostic Criteria Case Assessment Manage ment Drug Therapy Monitoring Specialist Referral Self Care Gestational Diabetes

NCD Prevention and Control

- Intervention Strategy: Promoting healthy lifestyle, dietary management and physical exercise.
- Duties and Responsibilities: Medical officer responsibilities in monitoring and follow up of patients including regular assessment and checkups.
- Recording and Reporting: The content including results of assessment and referrals.
- Evaluation: Key indicators including rates of control, complications, smoking, etc.

Diabetic Patients:
Classification: Defines diabetes mellitus types 1 and 2.
- Management: Outlines general objectives and management strategies including lifestyle modifications and treatment sequences (diet and physical exercise followed by drug therapy).
- Drug Therapy: Recommended treatment protocols for types 1 and 2 diabetes, including oral hypoglycaemic agents, insulin, and how to manage diabetic emergencies.

- Monitoring: Control criteria based on 2-hr PPG, fasting total serum cholesterol, blood pressure and quality and frequency of follow up examinations.
- Specialist Referrals: Indications for referral to specialists.
- Self-Care: Content of self-care including instructions to relevant medical providers.

The UNRWA TIs also include flow chart (Annex 3) for the management of diabetes mellitus indicating when to start drug therapy and treatment protocols including: oral mono-therapy, oral combination therapy, insulin treatment and oral drugs in combination with insulin.

4.1 UNRWA diabetes care

Based on the current Technical Instructions, UNRWA provides diabetes care in all 139 primary health centres. Patients are screened annually for diabetes mellitus if they are 40 years of age or older, if they are at risk for NCD or if they are pregnant or planning to conceive. DM screening is performed by measuring random blood glucose (RBG) during one week through two fasting blood glucose measurements. If both measurements are ≥ 126 mg/dl, DM is diagnosed. If results are below 100, the patient is checked again the following year. If the readings are between 100-125 mg/dl, an oral glucose tolerance test (OGTT) is performed to confirm of exclude diabetes diagnosis.

Patients diagnosed with diabetes are managed at the NCD clinic located in each health centre. The NCD clinic is staffed with medical officer(s) and nurse(s), and provides care for patients with diabetes and/or hypertension. As part of UNRWA's 2011 health reform, Family Health Teams (FHTs) were introduced in health centres and services were integrated into one comprehensive service, rather than disease-specific. Nevertheless, the following setting for diabetes care is in principle the same.

Once diagnosis is made, patients are clinically assessed for complications and co-morbidities such as hypertension (blood pressure of 140/90 mm/Hg or above). This, along with written notes and clinical information (including lab results), is recorded in a patient registration file. Patients are categorized into three main groups: type 1 diabetes, type 2 diabetes, or diabetes with hypertension. Patients are managed according to a standard algorithm with diet and lifestyle advice. Treatment can include oral hypoglycaemic agents (OHA) only (Glibenclamide, Gliclazide, and Metformin) either in a one or two-drug regimen (Metformin and Glibenclamide or Gliclazide), insulin or a combination of both OHA and insulin.

Control status is assessed based on 2hr PPG measurements. Patients with uncontrolled DM are seen weekly or monthly until they control status is reached. The follow-up schedule for patients with controlled DM is a clinical checkup every 3 months. During this visit, patients are assessed by the medical providers as follows: clinical examination, body mass index, urine for glucose and albumin, measurement of 2hr PPG, blood pressure and the presence or absence of late complications.

Once a year, all DM patients are expected to receive a foot examination and are referred to an ophthalmologist for a fundoscopic examination. They may also be referred to a cardiologist for further evaluation if required.

5 Results

5.6 UNRWA DM care quality assessment

5.6.1 Patient demographics

Similar to 2012 audit, a total of 1,600 patients with type 1 diabetes, type 2 diabetes or diabetes with hypertension were enrolled in the study – from the eight largest health centres in each of the 4 participating fields (West Bank, Gaza Strip, Lebanon, Jordan). There were some differences in some of the variables as will be seen below.

5.6.1.1 Patient age and sex

The mean age of the patients was 57.1 ± 12.0 years, with a range of 6 to 96 years of age. This is in accordance with DM's global prevalence amongst the older population.

Table 4: Patient age and sex distribution

Age	Sex					
	Female		**Male**		**Total**	
	2012	**2015**	**2012**	**2015**	**2012**	**2015**
0-19	15	13	21	8	36	21
20-39	50	47	26	27	76	74
40-59	527	539	275	255	802	794
60+	428	433	258	278	686	711
Total	1020 (63.8%)	1032 (64.5%)	580 (36.2%)	568 (35.5%)	1600 (100.0%)	1600 (100.0%)

As in the previous audit, nearly two-thirds (64.5%) of the patients were female – an accurate reflection of the general UNRWA health centre population which is 63.8% female. The disproportionate number of females is largely due to health centre service hours (7:30-14:00) which are more favourable for those who do not work outside of the home. This distribution of sex influenced study findings, including in the analysis of risk factors, as results were not separated by sex.

5.6.2 Disease pattern

Out of the 1600 patients, 57 (3.6%) patients in the second audit were type 1 diabetic, as opposed to 68 (4.3%) in the first audit. The remaining 1543 (96.4%) patients were type 2 diabetic, of which 1155 (72.2%) were also hypertensive as compared to 1532 (95.7%) and 1102 (68.9%) respectively in the first audit. Overall, the mean age of patients in the second clinical audit was 57.1 (±12.0) years of age, a slight increase from 56.6 (±12.6) years of age in the first audit.

Just as in the first audit, data on duration of illness was not assessed as it cannot be reliably measured. Instead, the disease pattern was assessed against the duration of care for diabetes provided at UNRWA health centres. As UNRWA is the main primary health care provider to Palestine refugees, we can assume that duration of care is an accurate proxy measure of duration of illness. Overall, the mean duration of care, as measured by when the patient started receiving care for diabetes at an UNWRA NCD clinic, was slightly higher in the second clinical audit. Mean duration of care was 8.5 (±5.4) years, an increase of 1.3 years from 7.2 (±4.9) years in the first audit.

Table 5: Mean age and duration of care in UNRWA health centre by type of diabetes

Diabetes type	Number of patients						Mean age (years)		Mean duration of care (years)	
	Female		**Male**		**Total**					
	2012	2015	2012	2015	**2012**	**2015**	**2012**	**2015**	**2012**	**2015**
Type 1	37	32	31	25	68	57	25.2 (±12.9)	23.8 (±10.7)	8.1 (±4.9)	8.4 (±6.1)
Type 2	270	232	160	156	430	388	53.5 (±10.4)	53.6 (±9.2)	5.9 (±4.3)	7.0 (±4.9)
DM & HTN	713	768	389	387	1102	1155	59.8 (±10.2)	60.0 (±9.9)	7.8 (±5.0)	9.1 (±5.5)
Total	1020 100%	1032 100%	580 100%	568 100%	1600 100%	1600 100%	56.6 (±12.6)	57.1 (±12.0)	7.2 (±4.9)	8.5 (±5.4)

Patients with type 1 diabetes were the youngest (23.8 years in 2015, 25.2 years in 2012) and had a long duration of care (8.4 years). However, unlike the first audit, duration of care in the second audit was longest among patients with diabetes and hypertension at 9.1 years, followed by type 1 (8.4) and then type 2 (7.0). Among patients with type 2 diabetes, those with hypertension comorbidity were the oldest at 60.0 years of age (compared to 59.8 years of age in the first audit). The mean age of type 2 diabetic patients without hypertension was 53.6 years of age in the second audit, almost identical to the 53.5 mean age of this category in the first audit.

Table 6: Duration of care

Duration	Patients	
	2012	**2015**
1-5 years	688 (43.0%)	597 (37.3%)
6-10 years	514 (32.1%)	480 (30%)
11-15 years	284 (17.8%)	334 (20.9%)
>15 years	103 (6.4%)	189 (11.8%)
No record	11 (0.7%)	0 (0.0%)
Total	1600 (100.0%)	1600 (100.0%)

Overall, the second clinical audit had more patients with longer history of diabetes care at UNRWA facilities – where the number of patients with 15 or more years of care was increased from the first audit, from 103 (6.4%) in the first audit to 189 (11.8%) in the second audit. Conversely, patients with less than 5 years of care decreased by 6% from the first audit to the second audit, from 688 (43.0%) to 597 (37.3%). Implications of a population with a longer duration of care include that their history of diabetes is longer and therefore are at increased likelihood of developing associated complications due to this chronic, non-communicable disease.

5.6.3 Risk factors

5.6.3.1 Smoking

Out of the 1584 (99.0%) patients in the second audit who were over the age of 18, 332 (20.8%) were current smokers, 188 (11.8%) were ex-smokers, and 1080 (67.5%) were non-smokers. Smoking was found to be more prevalent among males, where 324 (57.0%) were either current or ex-smokers, while 196 (19.0%) females were either current or ex-smokers in the second clinical audit. This number indicates an increase in smoking across both sexes from the first audit, where 62.2% of males and 12.7% of females were either current or ex-smokers.

Table 7: Patient smoking rates by sex

Smoking status		Sex		Total
		Female	**Male**	
Current smoker	**2012**	115 (11.3%)	198 (34.1%)	313 (19.6%)
	2015	137 (13.3%)	195 (34.3%)	332 (20.8%)
Ex-smoker	**2012**	15 (1.5%)	47 (8.1%)	62 (3.9%)
	2015	59 (5.7%)	129 (22.7%)	188 (11.8%)
Non-smoker	**2012**	890 (87.3%)	335 (57.8%)	1225 (76.6%)
	2015	836 (81.0%)	244 (43.0%)	1080 (67.5%)
Total	**2012**	1020 (63.8%)	580 (36.3%)	1600 (100%)
Total	**2015**	1032 (64.5%)	568 (35.5%)	1600 (100%)

It is possible that women may falsely deny smoking due to social pressures, resulting in a reporting bias leading to an underestimation of smoking as a risk factor amongst this group. When this issue is further analyzed, using host country national data it was found that patients in the clinical audit smoke less than country population in both Jordan and Lebanon.

Table 8: Tobacco smoking prevalence in Jordan and Lebanon (Audit and Host Country Data)

Country	Male				Female			
	Clinical audit		Host country		Clinical audit		Host country	
	2012	2015	2012	2015	2012	2015	2012	2015
Jordan	39.1%	36.2%	48.8%	43.4%	11.5%	9.7%	4.1%	8.5%
Lebanon	52.6%	41.4%	44.1%	43.0%	26.8%	34.1%	30.0%	21.2%

5.6.3.2 Alcohol intake

As was the case in the first audit where only 7 patients (0.4%) reported any alcohol intake, the second clinical audit found only 19 patients (1.2%) to consume any alcohol. This low rate is not surprising given the patient population is generally a conservative, Muslim group where cultural and religious context does not permit alcohol consumption. For the same reason, it is possible that some patients falsely denied alcohol consumption.

5.6.3.3 Overweight and obesity

As with the first audit, a high prevalence of obesity was found among UNRWA diabetic patients. The mean BMI was 32.6, as compared to a mean BMI of 32.1 in the first audit. Nearly two thirds, 1052 (65.7%) patients in the second audit were obese with a BMI greater than 30 – an increase of 1.7% from the first audit.

Table 9: Diabetic patient BMI by sex

Weight status		Sex		Total
		Female	Male	
Underweight (BMI < 18.5)	2012	8 (0.8%)	10 (11.7%)	18 (1.1%)
	2015	5 (0.5%)	4 (0.7%)	9 (0.6%)
Normal weight (BMI 18.5-24.9)	2012	51 (5.0%)	86 (14.8%)	137 (8.6%)
	2015	60 (5.8%)	77 (13.6%)	137 (8.6%)
Overweight (BMI 25-29.9)	2012	215 (21.1%)	206 (35.5%)	421 (26.3%)
	2015	206 (20.1%)	195 (34.2%)	401 (25.1%)
Obese (BMI ≥ 30)	2012	746 (73.1%)	278 (47.9%)	1024 (64.0%)
	2015	761 (74.1%)	292 (51.6%)	1053 (65.8%)
Total	2012	1020 (63.8%)	580 (36.3%)	1600 (100%
Total	2015	1032 (64.5%)	568 (35.5%)	1600 (100%)

Figure 2: Palestine refugee body weight status (UNRWA 2012 Clinical Audit) and host-country population (Jordan – WHO 2011 data)

The prevalence of obesity among UNRWA diabetes patients is much higher the prevalence of obesity within the host countries themselves.
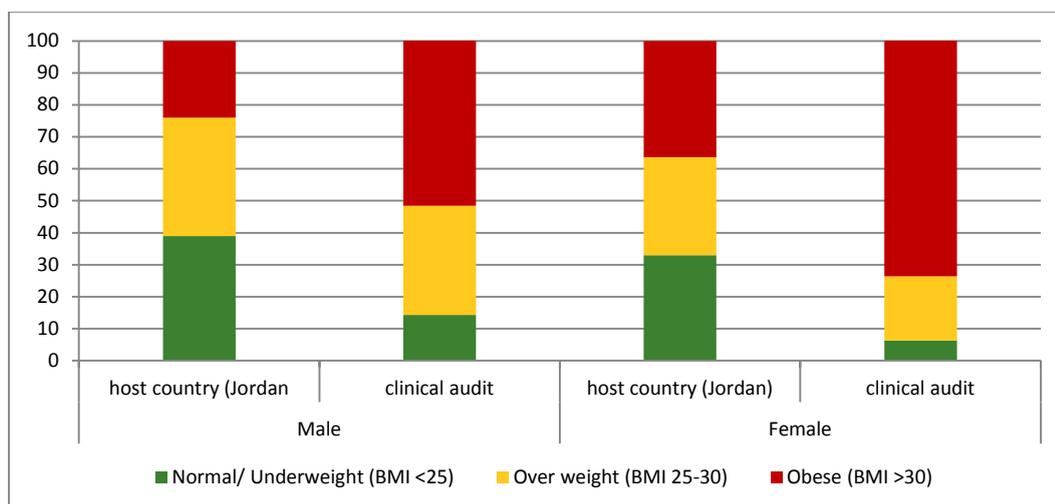
Figure 3: Type 1 diabetes patient BMI

Type 1 Diabetes Patient BMI
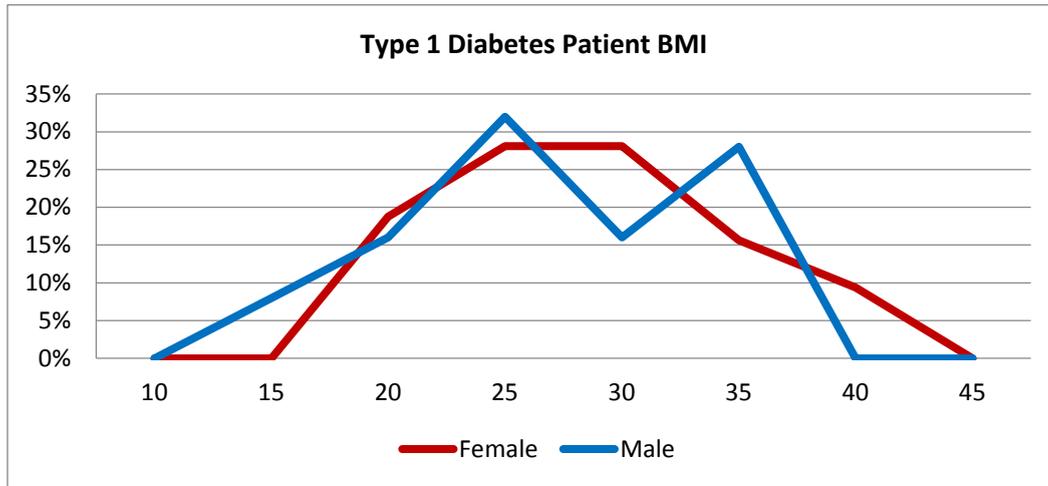
Figure 4: Type 2 diabetes patient BMI

Type 2 Diabetes Patient BMI
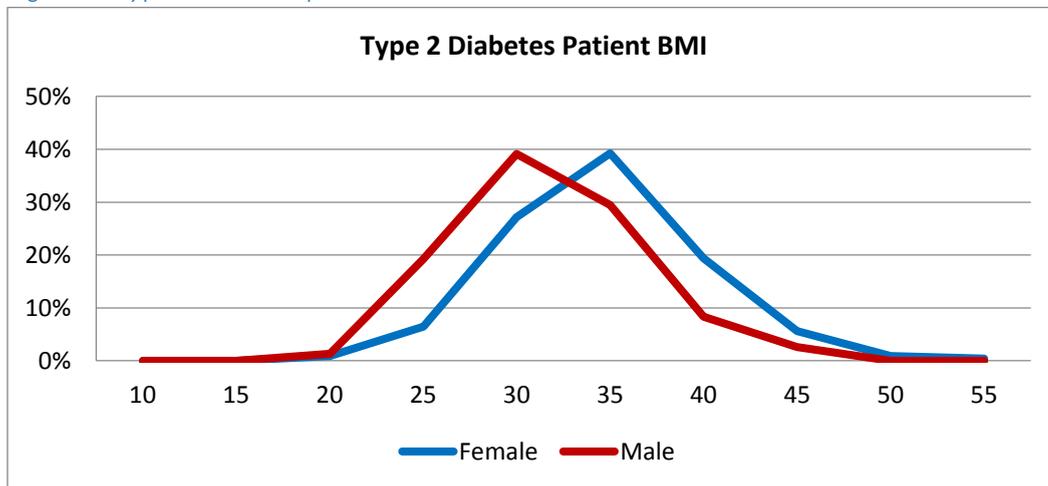
5.6.4 Diabetes management

UNRWA Technical Instructions describe an intervention strategy composed of lifestyle modifications (e.g.: dietary management and physical exercise) as a base, with drug therapy oral hypoglycaemic agents (OHA) with or without insulin injections as needed.

5.6.4.1 Healthy lifestyle promotion and patient support

The following tables show the number and type of health education sessions diabetic patients received according to patient memory during the year prior to the audit interview.

Table 10: Health education sessions received

Health education sessions	Patients	
	2012	**2015**
0	283 (17.7%)	12 (0.8%)
1	308 (19.3%)	169 (10.6%)
2	324 (20.3%)	135(8.4%)
3	324 (20.3%)	388 (24.3%)
4	164 (10.3%)	290 (18.1%)
5	197 (12.3%)	190 (11.9%)
>5	0 (0.0%)	416 (26%)
Total	1600 (100.0%)	1600 (100.0%)

Figure XX: Health education sessions received
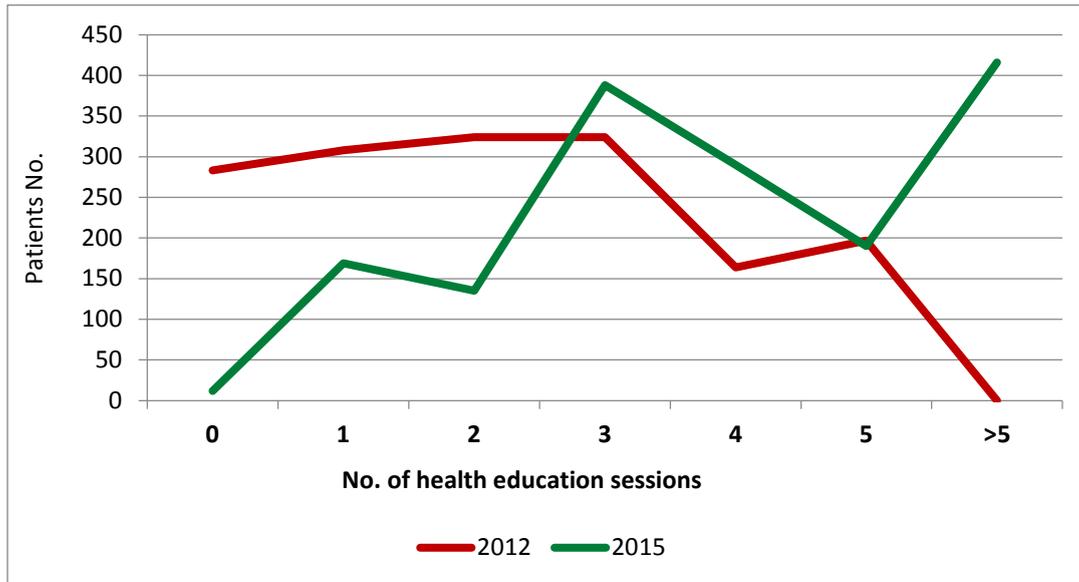
Table 11: Type of health education session received

Education session	Patients	
	2012	**2015**
Diet	256 (16.0%)	1483 (92.7%)
Hyperglycemia	47 (2.9%)	1137 (71.1%)
Exercise	393 (24.6%)	1340 (83.8%)
Foot care	263 (16.4%)	944 (59.0%)
Chronic complications	257 (16.1%)	709 (44.3%)
Hypoglycaemia	9 (0.6%)	558 (34.9%)
Others	0 (0.0%)	184 (11.5%)
Unknown	92 (5.8%)	1 (0.1%)
None	283 (17.7%)	0 (0.0%)
Total (education session)	1600	6356

*Note: Each patient could attend more than one education session.

Health education sessions for patients were heavily promoted as a result of the first clinical audit. As a result, the numbers of health education sessions attended by patients increased dramatically in the second audit. All patients received at least 1 education session in the second audit, whereas 283 (17.7%) patients in the first audit participated in zero sessions.

According to UNRWA TI's, patients should receive at least four health education sessions during assessment visits each year. The second audit revealed that the number of patients who received 4 or more health education sessions was 56% - more than doubling from 22.6% during the first audit.

As mentioned above, patient participation in health education sessions was heavily promoted. As a result, the overall number of sessions received increased dramatically. Specifically, all types of sessions saw marked increases – such as diet which was received by 92% of patients, an increase of nearly 6 times from the first audit. Overall, a total of 6356 health education sessions were received by patients in the second clinical diabetes audit, an increase of 5039 sessions from 1317 total sessions received in first audit.

The sharp increase in education sessions received highlights a gap that was found and addressed from the first audit. At that time, staff capacity building courses were highlighted as point of contact with UNRWA staff to emphasize the importance of patient education and where nurses needed to be empowered to deliver health education and support in order to lighten the burden faced by medical officers. The production of simply educational materials, including diabetes handbook, was also suggested as a possibility at that time.

5.6.4.2 Clinical management

The following table shows the clinical management of UNRWA patients by type of diabetes.

Table 12: Treatment versus diabetes type

Treatment		Diabetes type			
		Type 1	Type 2	DM & hypertension	Total
Lifestyle	2012	0	11	52	63 (3.9%)
	2015	0	8	34	42 (2.6%)
OHA	2012	0	306	785	1091 (68.2%)
	2015	0	275	787	1062 (66.4%)
OHA & insulin	2012	9	69	153	231 (14.4%)
	2015	9	75	256	340 (21.3%)
Insulin	2012	59	43	105	207 (12.9%)
	2015	48	30	78	156 (9.8%)
Outside UNRWA	2012	0	2	6	8 (0.5%)
	2015	1	4	17	22 (1.4%)
Total	2012	68	431	1101	1600
Total	2015	58	392	1172	1622

*Note: outside UNRWA indicates that patient received unknown treatment outside of UNRWA either in addition to their UNRWA care or exclusively.

In both audits, the most commonly used treatment was oral hypoglycaemic agents (OHA). Roughly two thirds of patients (66.4%) in the second audit used OHA only, down slightly from 68.2% in the first audit. Combined OHA and insulin therapy was second most used, at 21.3%, up significantly from 14.4% in the first audit.

Table 13: Diabetes medication types prescribed

Type	Medicines	Patients	
		2012	2015
OHA monotherapy			
	Metformin	279 (17.4%)	325 (20.3%)
	Gliclazide	40 (2.5%)	25 (1.6%)
	Glibenclamide	84 (5.3%)	25 (1.6%)
	Subtotal	403 (25.2%)	375 (23.4%)
OHA combination therapy			
	Metformin + Gliclazide	179 (11.2%)	234 (14.6%)
	Metformin + Glibenclamide	509 (31.8%)	453 (28.3%)
	Subtotal	688 (43.0%)	687 (42.9%)
OHA & insulin			
	Insulin + Metformin	178 (11.1%)	284 (17.8%)
	Insulin + Gliclazide	5 (0.3%)	11 (0.7%)
	Insulin + Glibenclamide	12 (0.8%)	0 (0.0%)
	Insulin + Metformin + Gliclazide	14 (0.9%)	19 (1.2%)
	Insulin + Metformin + Glibenclamide	22 (1.4%)	26 (1.6%)
	Subtotal	231 (14.4%)	340 (21.3%)
Other			
	Insulin only	207 (12.9%)	156 (9.8%)
	Lifestyle	63 (3.9%)	42 (2.6%)
	Outside UNRWA exclusively	8 (0.5%)	0 (0.0%)
	Subtotal	278 (17.4%)	198 (12.4%)
Grand total			
	Total	1600 (100.0%)	1600 (100.0%)

Overall, number of patients on OHA monotherapy decreased by 2% to 23.4% in the second audit, while the number on OHA combination therapy remained steady at 42.9%. Patients on any form of insulin therapy increased from 27.3%, to 31.1%, however the number of patients on insulin exclusively decreased by 3% to 9.8% since the first audit. The number of patients taking no medications, instead focusing on lifestyle management decreased to 2.6% from 3.9%.

Of the 57 patients with type 1 diabetes, 48 (84.2%) were on insulin exclusively, while 9 (15.8%) were on a combination of OHA and insulin.

A total of 83.7% patients in the second audit were using Metformin, either exclusively or in combination – an increase from 77% in the first audit. This is reasonable, as Metformin is the drug of choice in obese and overweight diabetic patients. Almost all patients could receive Metformin first, if there are no contraindications (e.g. severe kidney disease) or tolerance issues (e.g. severe GI side effects). Medical officers are prescribing sensible medical combinations.

Table 14: Patient insulin units per day

Units / day	Patients	
	2012	2015
≤ 30	117 (26.6%)	110 (22.1%)
31-60	202 (45.9%)	244 (49.1%)
61-90	97 (22.0%)	110 (22.1%)
> 90	24 (5.5%)	33 (6.6%)
Total	440 (100.0%)	497 (100.0%)

Overall, the number of patients on insulin of any dose increased by 3.5% in the second audit. However, the distribution of patients by number of insulin units per day remained steady between audits. The distribution of patients by daily dose is reasonable, there only 6.6% of patients receiving high doses which may be due to obesity. Dosing is usually linked to each individual patient case and so assessment is beyond the objective of this audit. We can conclude that Medical Officers have a reasonable understanding of proper insulin use.

Table 15: Insulin injection practice

Insulin injection	Patients	
	2012	2015
Self-injection	337 (77.8%)	427(85.9%)
Assisted injection	96 (22.2%)	70 (14.1%)
Total	433 (100.0%)	497(100.0%)

The vast majority (85.9%) of patients are managing their insulin medication through self-injection, which is an improvement since the last audit, it is acceptable and appropriate. Those that require assistance may either be too young or too old, or may have a complications or conditions which prevent them from self-injecting. In general, self-injection is better for the management of diabetes. Patient injection education is important and needs to be addressed in counselling sessions.

5.6.5 Diabetes monitoring
Information on the UNWRA Technical Instructions on diabetes patient monitoring can be found in the first clinical diabetes audit, or online. The following section provides audit results regarding the various monitoring tests applied.

Table 16: Implementation status of monitoring examinations

Monitoring exams	2012			2015		
	Results recorded	No results recorded	Total	Results recorded	No results recorded	Total
Post-prandial blood glucose	1515 (94.7%)	85 (5.3%)	1600 (100%)	1534 (95.9%)	66 (4.1%)	1600 (100%)
Fasting cholesterol	1543 (96.4%)	57 (3.6%)	1600 (100%)	1560 (97.5%)	40 (2.5%)	1600 (100%)
Creatinine	1463 (91.4%)	137 (8.6%)	1600 (100%)	1568 (98.0%)	32 (2%)	1600 (100%)
Urine protein	1400 (87.5%)	200 (12.5%)	1600 (100%)	1468 (91.7%)	132 (8.3%)	1600 (100%)
Fundoscopy	757 (47.3%)	843 (52.7%)	1600 (100%)	787 (49.2%)	813 (50.8%)	1600 (100%)

Two hour post-prandial glucose (2-hr PPG), fasting cholesterol, creatinine and urine protein were regularly recorded for most patients (95.9%, 97.5%, 98.0%, 91.7% respectively in the second audit). Slight increases in conducting of all tests can be seen in the second clinical audit as compared to the first clinical audit. The first audit highlighted fundoscopy as a monitoring test which needs increased implementation – however, the second audit shows that implementation is still low, although a slight increase of 2% since the first audit is seen. UNRWA guidelines currently recommend an annual fundoscopy, yet more than half of patients are not being referred to an ophthalmologist.

The audit also assessed patient use of glucose self-monitoring tools (blood and urine) at home. UNRWA relies on patients to obtain such tools, as they are not provided at the health centres. These tools help patients manage their diabetes, using glucometers for blood glucose or urine strips. Home monitoring is crucial in the first year of diabetes treatment, particularly for those with type 1 diabetes. It is a learning process that helps people understand the consequences of lifestyle and how to adjust according to metabolic need. The following table shows the patient utilization rate of self-monitoring tools. For blood glucose monitoring (glucometer), we separated patients with type 1 diabetes – as the test is particularly crucial for this population.

Table 17: Blood and urine glucose self-monitoring

Monitoring test		2012			2015		
		Patient self-monitoring	Patients not self-monitoring	Total	Patient self-monitoring	Patients not self-monitoring	Total
Blood glucose	All patients	521 (32.6%)	1079 (67.4%)	1600 (100%)	585 (36.6%)	1015 (63.4%)	1600 (100%)
	Type 1 patients	45 (66.2%)	23 (33.8%)	68 (100%)	38 (66.7%)	19 (33.3%)	57 (100%)
Urine glucose	All patients	2 (0.2%)	1598 (99.8%)	1600 (100%)	7 (0.4%)	1593 (99.6%)	1600 (100%)

The use of glucometers increased by 4% between the audits. That being said, 73.4% of patients in the second audit were not using glucometers to measure blood glucose. Two thirds of type 1 patients were using the tool – leaving one third without this crucially important self-monitoring tool. The reasons for not self-monitoring may be complex, however financial difficulties are likely to play a factor in whether one acquires a glucometer as they are not provided by UNRWA. As was the case in the first audit, UNRWA needs to continue to explore how to ensure that all type 1 diabetes patients have access to a glucometer for self-monitoring.

Urine monitoring strips were virtually unused in both the first and second clinical audits. Urine monitoring is becoming obsolete for diabetes self-monitoring, and findings suggest that patients no longer prefer this type of monitoring.

5.6.6 Diabetes treatment outcome

5.6.6.1 Postprandial blood glucose test results

UNRWA uses 2-hr PPG results for diabetes monitoring and control. As per UNRWA TI's, diabetes control is achieved when 2-hr PPG becomes equal or less than 180 mg/dl (≤10.0 mmol/L). The audit reviewed patient medical records for previous 2-hr PPG results. Information was available for 1,534 out of 1,600 patients in the second audit.

The mean 2-hr PPG was 194.1 mg/dl in the second clinical audit, as compared to a mean of 200.2 mg/dl in the first audit. The range was 55-585 mg/dl.

Table 18: Diabetes control status via 2-hr PPG by type

Diabetes type	Controlled (≤ 180 mg/dl)		Uncontrolled (> 180 mg/dl)		No data		Total	
	2012	2015	2012	2015	2012	2015	2012	2015
Type 1	29 (42.6%)	26 (45.6%)	34 (50.0%)	24 (42.1%)	5 (7.4%)	7 (12.3%)	68 (100.0%)	57 (100.0%)
Type 2	183 (42.6%)	210 (54.1%)	226 (52.5%)	168 (43.3%)	21 (4.9%)	10 (2.6%)	430 (100.0%)	388 (100.0%)
DM with hypertension	504 (45.7%)	568 (49.2%)	539 (48.9%)	537 (46.5%)	59 (5.4%)	50 (4.3%)	1102 (100.0%)	1155 (100.0%)
Total	716 (44.8%)	804 (50.3%)	799 (49.9%)	729 (45.6%)	85 (5.3%)	67 (4.1%)	1600 (100.0%)	1600 (100.0%)

The proportion of patients who achieved glycaemic control level for a 2-hr PPG increased from approximately 45% in the first audit to 50% in the second audit. This is within the acceptable range of glycaemic control. The control rates using 2-hr PPG are similar across the different types of diabetes.

Table 19: Treatment type by 2-hr PPG control status

Treatment	Controlled (≤ 180 mg/dl)		Uncontrolled (> 180 mg/dl)		No data		Total	
	2012	2015	2012	2015	2012	2015	2012	2015
Lifestyle	51 (81.0%)	33 (78.6%)	4 (6.3%)	5 (11.9%)	8 (12.7%)	4 (9.5%)	63 (100.0%)	42 (100.0%)
OHA	523 (47.9%)	562 (52.9%)	516 (47.3%)	467 (44.0%)	52 (4.8%)	33 (3.1%)	109 (100.0%)	1062 (100.0%)
OHA and insulin	73 (31.6%)	138 (40.6%)	149 (64.5%)	186 (54.7%)	9 (3.9%)	16 (4.7%)	231 (100.0%)	340 (100.0%)
Insulin	64 (30.9%)	72 (46.2%)	128 (61.8%)	71 (45.5%)	15 (7.2%)	13 (8.3%)	207 (100.0%)	156 (100.0%)
Outside UNRWA	5 (62.5%)	0 (0.0%)	2 (25.0%)	0 (0.0%)	1 (12.5%)	0 (0.0%)	8 (100.0%)	0 (100.0%)
Total	716 (44.8%)	805 (50.3%)	799 (49.9%)	729 (45.6%)	85 (5.3%)	66 (4.1%)	1600 (100.0%)	1600 (100.0%)

The audit further analyzed 2-hr PPG control rates using treatment types. Control rate was highest among those with improved lifestyle (78.6%), followed by OHA (52.9%). The high control rate among those with lifestyle treatment is predictable. Patients under lifestyle management tend to be affected by milder forms of diabetes and have shorter clinical history of disease. Patients on insulin therapy have lower rates of control: 46.2% for insulin only and 40.6% for insulin and OHA combination. This is not a reflection of treatment, but instead a reflection of the life course of diabetes. The more complicated the disease, the lower the control rate.

5.6.6.2 HbA1c test results

Table 20: HbA1c control status by diabetes type

Type of diabetes	Controlled (HbA1c < 7%)		Uncontrolled (HbA1c ≥ 7%)		Total	
	2012	**2015**	**2012**	**2015**	**2012**	**2015**
Type 1	5 (7.4%)	3 (5.3%)	63 (92.6%)	54 (94.7%)	68 (100.0%)	57 (100%)
Type 2	108 (25.1%)	110 (28.4%)	332 (74.9%)	278 (71.4%)	430 (100.0%)	388 (100%)
DM with hypertension	339 (30.8%)	289 (25%)	763 (69.2%)	866 (75%)	1102 (100.0%)	1155 (100%)
Total	452 (28.3%)	402 (25.1%)	1148 (71.7%)	1198 (74.9%)	1600 (100.0%)	1600 (100%)

Table 21: HbA1c control status by treatment type

Treatment	Controlled (HbA1c < 7%)		Uncontrolled (HbA1c ≥ 7%)		Total	
	2012	**2015**	**2012**	**2015**	**2012**	**2015**
Lifestyle only	55 (87.3%)	33 (78.5%)	8 (12.7%)	9 (12.5%)	63 (100%)	42 (100%)
OHA only	355 (32.5%)	333 (31.4%)	736 (67.5%)	729 (68.6%)	1091 (100%)	1062 (100%)
OHA and insulin	19 (8.2%)	25 (7.4%)	212 (91.8%)	315 (92.6%)	231 (100%)	340 (100%)
Insulin only	18 (8.7%)	11 (7.1%)	189 (91.3%)	145 (92.9%)	207 (100%)	156 (100)
Treatedoutside UNRWA	5(62.5%)	0	3(37.5%)	0	8 (100%)	0
Total	452 (28.3%)	402 (25.2%)	1148 (71.7%)	1198 (74.8%)	1600 (100%)	1600 (100%)

Table 22: HbA1c results by diabetes type

Diabetes type	HbA1c < 7%		HbA1c 7-8%		HbA1c ≥ 8%		Total	
	2012	**2015**	**2012**	**2015**	**2012**	**2015**	**2012**	**2015**
Type 1	5 (7.4%)	3 (5.3%)	8 (11.8%)	5 (8.8%)	55 (80.9%)	49 (85.9%)	68 (100.0%)	57 (100%)
Type 2	108 (25.1%)	110 (28.3%)	93 (21.6%)	81 (20.9%)	229 (53.3%)	197 (50.8%)	430 (100.0%)	388 (100%)
DM with hypertension	339 (30.8%)	289 (25%)	221 (20.1%)	287 (24.8%)	542 (42.2%)	579 (50.1%)	1102 (100.0%)	1155 (100%)
Total	452 (28.3%)	402 (25.1%)	322 (20.1%)	373 (23.3%)	826 (51.6%)	825 (51.6%)	1600 (100.0%)	1600 (100%)

Table 23: HbA1c results by treatment type

Treatment type	HbA1c < 7%		HbA1c 7-8%		HbA1c ≥ 8%		Total	
	2012	2015	2012	2015	2012	2015	2012	2015
Lifestyle only	55 (87.3%)	33 (78.5%)	6 (9.5%)	5 (11.9%)	2 (3.2%)	4 (9.5%)	63 (100.0%)	42 (100%)
OHA only	355 (32.5%)	333 (31.4%)	272 (24.9%)	285 (26.8%)	464 (42.5%)	444 (41.8%)	1091 (100.0%)	1062 (100%)
OHA and insulin	19 (8.2%)	25 (7.4%)	20 (8.7%)	60 (17.6%)	192 (83.1%)	255 (75%)	231 (100.0%)	340 (100%)
Insulin only	18 (8.7%)	11 (7.1%)	24 (11.6%)	23 (14.7%)	165 (79.7%)	122 (78.2%)	207 (100.0%)	156 (100%)
Treated outside UNRWA	5 (62.5%)	0	0 (0.0%)	0	3 (37.5%)	0	8 (100.0%)	0
Total	452 (28.3%)	402 (25.1%)	322 (20.1%)	373 (23.3%)	826 (51.6%)	825 (51.6%)	1600 (100.0%)	1600 (100%)

Figure 5: HbA1c results by diabetes type
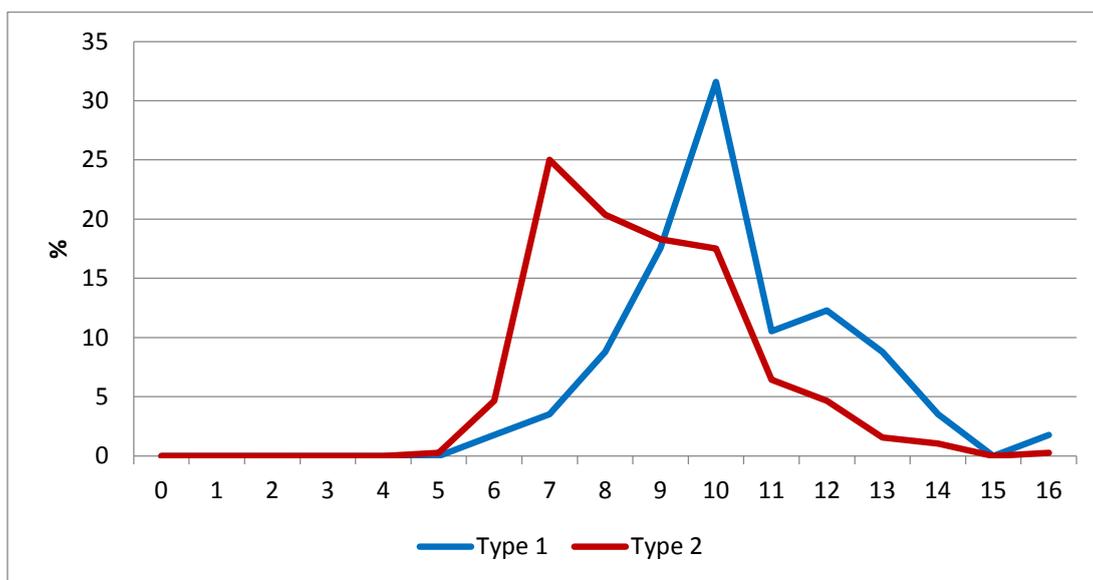
Figure 6: Type 2 diabetes patient HbA1c results by treatment type
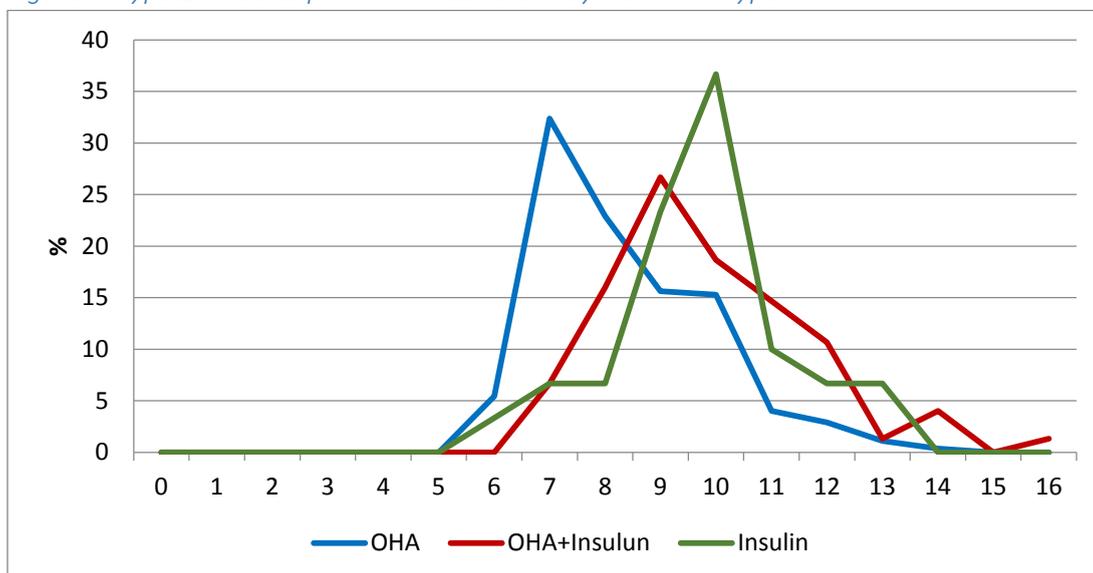
Table 24: Average HbA1c results by diabetes care duration and type

Care duration	0-4 years		5-9 years		10-14 years		≥ 15 years	
	2012	2015	2012	2015	2012	2015	2012	2015
Type 1	10.2	10.3	10.6	10.0	9.1	9.4	10.1	9.6
Type 2	7.8	7.6	8.7	8.5	9.6	8.9	9.2	8.7
DM with hypertension	7.7	7.6	8.3	8.2	8.6	8.5	8.8	8.8

Table 25: Comparison between 2-hr PPG and HbA1c results

		HbA1c		Total
		< 7%	≥ 7%	
PPG results	< 180 mg/dl	316	489	805
	≥ 180 mg/dl	70	659	729
Total		386	1148	1534

5.6.7 Hypertension management among diabetes patients

UNRWA Technical Instructions define blood pressure below 140/90 mmHg as the control target for diabetic patients also affected by hypertension. Among the 1155 patients with diabetes and hypertension assessed in this audit, the mean systolic pressure was 136.4 mmHg (range: 90-204 mmHg) and the mean diastolic pressure was 80.9 mmHg (range: 42-130 mmHg).

Table 26: Antihypertensive medications

Medication	Number of patients	
	2012	2015
ACE inhibitor	750 (46.9%)	900 (56.3%)
B-blocker	647 (40.4%)	571 (35.7%)
Diuretic	354 (22.1%)	454 (28.4%)
Calcium antagonist	146 (9.1%)	214 (13.4%)
Treated outside UNRWA	246 (15.4%)	65 (4.1%)

*Note: some patients were on combination treatments with more than one type of drug

As was the case in the first audit, the most commonly prescribed antihypertensive medications were ACE inhibitors (56.2% of all patients) which increased from the previous audit, and is in line with UNRWA TIs, β-blockers (35.7%), diuretics (28.4%), and lastly, calcium antagonists (13.4%). Far fewer patients in the second audit (4.1% vs 15.4%) sought antihypertensive medications outside of UNRWA which may be as a result of increased and improved formulary now available at UNRWA.

These treatment patterns are in line with UNRWA guidelines and recommendations. ACE inhibitors are the drug of choice for diabetic patients with elevated blood pressure. The use of diuretics increased in the second audit, however remains low considering that current recommendation suggest adding diuretics to an ACE inhibitor. When this 2-drug combination is not sufficient, a 3-drug combination treatment is recommended (ACE inhibitor, diuretics, and calcium antagonist or β-blocker).

Table 27: Blood pressure control status (140/90 mmHg)

Diabetes control status	DM with hypertension	
	2012	2015
Controlled (< 140/<90 mmHg)	612 (55.5%)	664 (57.5%)
Uncontrolled (≥ 140/≥90 mmHg)	490 (44.5%)	491 (42.5%)
Total	1102 (100%)	1155 (100%)

The hypertension control rate among the 1155 patients with diabetes and hypertension was 57.5% - a 2% increase from the first audit. Although there is standard international target, current UNRWA standards anticipate a 40-60% control rate; therefore, a control rate of 57.5% is acceptable.

The target blood pressure control has changed in many countries and international organizations over recent years from 140/90 mmHg to 130/80 mmHg in order to reduce cardiovascular and kidney complications.

Table 28: Updated blood pressure control status (130/80 mmHg)

Diabetes control status	DM with hypertension	
	2012	2015
Controlled (< 130/<80 mmHg)	310 (28.1%)	207 (17.9%)
Uncontrolled (≥ 130/>80 mmHg)	792 (71.9%)	948 (82.1%)
Total	1102 (100.0%)	1155 (100.0%)

Using the new criteria for hypertension control, UNRWA patient control status is very low at 17.9%. Unfortunately, the control rate has decreased substantially by 10.2% since the first audit. Of diabetes patients with hypertension assessed, 82.1% are at increased risk of developing complications of hypertension.

5.6.8 Risk factor management: cholesterol, creatinine and proteinuria

5.6.8.1 Cholesterol

UNRWA Technical Instructions define the target for total serum cholesterol control at <200 mg/dl or <6.5 mmol/L. Cholesterol test results were recorded for 1560 patients in the second clinical audit. The mean fasting cholesterol level was 186.8 mg/dl (range: 56-587 mg/dl).

Table 29: Mean cholesterol levels by diabetes type

Diabetes type	Cholesterol control status					
	Controlled (< 200 mg/dl)		Uncontrolled (≥ 200 mg/dl)		Total	
	2012	2015	2012	2015	2012	2015
Type 1	46 (75.4%)	36 (69.2%)	15 (24.6%)	16 (30.8%)	61 (100%)	52 (100%)
Type 2	248 (60.5%)	245 (65.2%)	162 (39.5%)	131 (34.8%)	410 (100%)	376 (100%)
DM with hypertension	635 (59.2%)	719 (63.5%)	437 (40.8%)	413 (36.5%)	1072 (100%)	1132 (100%)
Total	929 (60.2%)	1000 (64.1%)	614 (39.8%)	560 (35.9%)	1543 (100%)	1560 (100%)

UNRWA adopted a secondary prevention strategy targeting patients with diabetes and hypertension focused on lifestyle management with Aspirin, Atenolol and Enalapril – but not statins. Given UNRWA's current approach on cholesterol management, the observed control rate of 62.5% in the second audit (an increase of 2.3% from the first audit) is acceptable.

Statins are the standard of care for high cholesterol. Due to financial constraints, statins have not been introduced in UNRWA, except on a limited scale in some Fields. Statin use among 560 patients with high cholesterol (≥ 200 mg/dl) was analysed. Of those, 432 (77.1%) were being treated with statins or other lipid-lowering agents as shown in the following table. The situation is similar in all four Fields.

Table 30: Patients on anti-hyperlipidemia medication by Field

Field		Statin	Other lipid-lowering agents	None	Total
Jordan	2012	65 (44.2%)	14 (9.5%)	68 (46.3%)	147(100%)
	2015	91 (64.1%)	25 (17.6%)	26 (18.3%)	142 (100%)
West Bank	2012	58 (40.3%)	10 (6.9%)	76 (52.8%)	144(100%)
	2015	10 (7.6%)	120 (91.6%)	1 (0.8%)	131(100%)
Gaza	2012	46 (32.0%)	34 (23.6%)	64 (44.4%)	144(100%)
	2015	85 (66.4%)	1 (0.8%)	42 (32.8%)	128(100%)
Lebanon	2012	99 (55.3%)	2 (1.1%)	78 (43.6)	179(100%)
	2015	53 (33.3%)	47 (29.6%)	59 (37.1%)	159(100%)
Total	2012	268 (43.6%)	60 (9.8%)	286 46.6%)	614(100%)
	2015	239 (42.7%)	193 (34.5%)	128(22.8%)	560(100%)

Among 432 patients undergoing statin or other lipid-lowering drug treatment, information on the source of medications was acquired from 432 patients.

Table 31: Anti-hyperlipidemia medication source

| Field | | Source | | | | |
		Ministry of Health	Private	UNRWA	Other	Total
Jordan	2012	31(44.9%)	23 (33.3%)	0 (0.0%)	15(21.7%)	69 (100.0%)
	2015	18(15.5%)	10 (8.6%)	82 (70.7%)	6 (5.2%)	116(100.0%)
West Bank	2012	18(34.0%)	16 (30.2%)	19 (35.8%)	0 (0.0%)	53 (100.0%)
	2015	4 (3.1%)	12 (9.2%)	113(86.9%)	1 (0.8%)	130(100.0%)
Gaza	2012	1 (2.5%)	32 (80.0%)	0 (0.0%)	7 (17.5%)	40 (100.0%)
	2015	1 (1.2%)	2 (2.3%)	83 (96.5%)	0 (0.0%)	86 (100.0%)
Lebanon	2012	2 (2.5%)	66 (83.5%)	11 (13.9%)	0 (0.0%)	79 (100.0%)
	2015	0 (0.0%)	97 (97.0%)	0 (0.0%)	3 (3.0%)	100(100.0%)
Total	2012	52(21.6%)	137(56.8%)	30 (12.4%)	22 (9.1%)	241(100.0%)
	2015	23 (5.3%)	121 (28%)	278(64.4%)	10 (2.3%)	432(100.0%)

The source of statin and other lipid-lowering agents varied between fields. In Jordan, the West Bank and in Gaza, anti-hyperlipidemia medications were primarily received from UNRWA pharmacies. However, in Lebanon medications were primarily received from private pharmacies. Comparison from the first audit to the second audit highlights a significant increase in UNRWA pharmacy use and consequent drop in Ministry of Health or private pharmacy use.

5.6.8.2 Creatinine

Serum creatinine levels were available for 1568 patients (98.0%) in the second audit. This response rate is acceptable and reflects the correct implementation of UNRWA Technical Instructions.

Abnormal creatinine is defined in the TIs as a serum creatinine level above 1.2 mg/dl.

Table 32: Creatinine level by diabetes type

| Diabetes type | | Creatinine control status | | Total |
		Controlled (< 1.2 mg/dl)	Uncontrolled (≥ 1.2 mg/dl)	
Type 1	2012	58 (95.1%)	3 (4.9%)	61 (100.0%)
	2015	52 (94.5%)	3 (5.5%)	55 (100.0%)
Type 2	2012	393 (96.3%)	15 (3.7%)	408 (100.0%)
	2015	356 (94.9%)	19 (5.1%)	375 (100.0%)
DM with hypertension	2012	985 (92.5%)	80 (7.5%)	1065 (100.0%)
	2015	1007 (88.5%)	131 (11.5%)	1138 (100.0%)
Total	2012	1463 (93.6%)	98 (6.4%)	1561 (100.0%)
	2015	1415 (90.2%)	153 (9.8%)	1568 (100.0%)

Of the 1568 patients with creatinine results recorded, 153 (9.8%) have uncontrolled levels of creatinine greater than 1.2 mg/dl. This percentage indicates an increase of 3.4% from the first audit.

5.6.8.3 Urine proteins

UNRWA Technical Instructions indicate urine tests for macro-albuminuria should be carried out on a quarterly basis for diabetes patients. The results were available for 1468 patients in the second audit.

Negative test results were obtained for 1257 (85.6%) patients. Although a slight decrease from 89.7% in the first audit, these results still suggest good clinical management.

The care provided for the remaining patients with positive results needs careful assessment. Urine testing for macro-albumin is limited by the fact that it is not very specific. Macro-albuminuria could appear due to infection and other conditions, and therefore this finding alone does not provide strong evidence of renal function impairment.

Micro-albuminuria could be an important test to perform, as it is an early sign of kidney dysfunction. UNRWA may opt for a focused introduction of micro-albumin testing first targeting patients with uncontrolled diabetes and hypertension.

5.6.9 Complication management

5.6.9.1 Eye

All patients were interviewed to investigate their vision. There were a total of 5 (0.3%) blind patients, a decrease from 23 (1.4%) in the first audit.

UNRWA TIs indicate annual fundoscopy exams for diabetes patients. Fundoscopy exam results were available for 787 (49.2%) patients – a slight increase from 757 (47.3%) in the first audit. This indicates that the majority of patients are still not receiving fundoscopy exams.

Among the 787 patients who underwent fundoscopy exams, 299 were examined by UNRWA physicians while 488 were referred outside of UNRWA. This numbers indicate a shift in increasing referrals outside of UNRWA, as the first audit saw 408 (53.9%) of patients examined by UNRWA physicians and 349 (46.1%) referred outside. A total of 191 patients in the second audit were found to have retinopathy – a increase from 176 in the first audit.

As was the case in the first audit, there is a clear need to expand collaboration with ophthalmologists outside UNRWA to ensure higher coverage of annual fundoscopy exams.

5.6.9.2 Foot

The clinical audit team examined the lower limbs and/or feed of all 1600 patients enrolled in the audit. The examinations included an assessment of peripheral pulses, sensation and pathological changes, if any, including skin infection.

Table 33: Lower limb complications

Lower limb complications	Patients	
	2012	**2015**
Absent foot pulse	8 (0.8%)	53 (3.3%)
Acute ulcer/gangrene	30 (1.9%)	33 (2.1%)
Peripheral neuropathy	842 (52.6%)	484 (30.2%)
Amputation (above ankle)	6 (0.4%)	2 (0.1%)
Skin infection (fungal)	209 (13.1%)	186 (11.6%)
Skin infection (bacterial)	63 (3.9%)	31 (1.9%)
Total	1158 (72.4%)	789 (49.3%)

Skin mycosis were found in 186 (11.6%) of patients, a slight a decrease of 1.5% from the first audit. This exceeds the expected infection rate and has prompted UNRWA medical providers to focus on promoting adherence to personal hygiene during individual counselling and group health education sessions on foot care. Other findings are within expected range and are mostly related to the duration of disease and poor control status.

Trained nurses who could refer abnormal findings to medical officers can perform foot exams. Patient education prevents patient injuries and infections. The management of early signs can prevent further complications.

Other important findings were increased findings of absent foot pulse (3.3%), decreased peripheral neuropathy (30.2%), and fewer bacterial skin infections (1.9%).

5.6.9.3 Hypoglycaemia

Table xx: Hypoglycemia with type of treatment

Hypoglycemia with type of treatment	Patients (no. / %)	
	2012	**2015**
Lifestyle	7	7
OHA	182	355
OHA+Insulin	87	132
Insulin	124	64
Total	400 (25%)	558 (34.9%)

Hypoglycaemia is one of the most common acute complications among patients with diabetes, particularly those on insulin treatment (both types 1 and 2).

Among 1,600 patients assessed, 558 (34.9%) reported one or more episodes of hypoglycaemia during the prior year.

Among 558 patients who experienced hypoglycaemia, 196 were being treated with insulin. Considering that among 1,600 patients assessed in this audit, 496 patients receive insulin (either in mono or combination therapy), this finding indicates that 40% (196/496) of all patients treated with insulin experienced at least one episode of hypoglycaemia in the prior year. This could be related to quantity/quality of food, exercise, etc.

Although the global proportion of hypoglycaemia episodes is within an expected rate, it indicates low patient compliance to instructions and/or of insufficient health education provided by medical providers on hypoglycaemia causes and sequences.

In addition to case management factors, drug/insulin dosing and quality of meals should also be targeted in hypoglycaemia health education.

Most UNRWA medical officers in UNRWA do not consider hypoglycaemia important. In addition, as shown in Table 11, most patients do not remember hypoglycaemia health education, even though hypoglycaemia is an immediate threat, particularly for patients treated with insulin.

5.6.9.4 Peripheral neuropathy
Peripheral neuropathy was the most common early complication among the examined patients included in the audit. A total of 484 (30.2%) patients had peripheral neuropathy, a drastic decrease from the 842 (52.6%) patients with peripheral neuropathy in the first audit. Peripheral neuropathy was assessed as being present if the patient showed signs and symptoms: subjective feelings and/or abnormal findings upon examination of superficial and deep sensation.

5.6.9.5 Late complication management
UNRWA Technical Instructions define late complications of diabetes as total blindness, cerebral stroke, myocardial infarction and end-stage renal disease.

Table 34: Late complications

Late complications	Patients	
	2012	**2015**
Cardiovascular (MI)	149 (9.3%)	275 (17.2%)
Cerebral stroke	34 (2.1%)	60 (3.8%)
Total blindness	23 (1.4%)	5 (0.3%)
Amputation	6 (0.4%)	2 (0.1%)
End-stage renal disease	6 (0.4%)	2 (0.1%)
Total	218 (13.6%)	344 (21.5%)

*Note: Patients may have more than one late complication

Overall, the number of patients affected by late complications was not high – except for myocardial infarction which affected 275 (17.2%) patients in the second audit. This large number is nearly a doubling from 9.3% in the

first audit. The high number of myocardial infarctions reflects the need to address underlying factors and strictly follow UNRWA's secondary prevention strategy for patients with diabetes and hypertension with stricter monitoring of glycaemia control with HbA1c and introduction of statins.

Patients with late complications may not choose to access UNRWA services. They may go to hospitals or institutions where specialized care is available. The currently observed low rate of late complications in UNRWA health centres is not necessarily indicative of low prevalence. Patients with late complications could also be defaulters who are unable to attend health centres or among those have unfortunately passed away.

5.10 Diabetes campaign

Table 35: DM campaign attendance in 2015

	Yes	No	Total
DM campaign	162 (10.1%)	1438 (89.9%)	1600 (100.0%)

5.11 Repeat study participants

Table 36: Number of patients participating in both audits

	Yes	No	Total
First audit	32 (2.0%)	1568 (98.0%)	1600 (100.0%)

5.7 UNRWA Health Center Medical Officer DM Care Assessment:

5.2.1 Background

There were 65 medical officers from 32 health centres involved in the clinical audit. Among those, 65 (52.3%) were male and 31 (47.7%) were female.

The mean duration of diabetes care experience for these medical officers was 4.6 years (1- 18 years). There were 37 (61.7%) with less than 5 years of experience, 20 (33.3%) had 5-10 years, 2 (3.3%) had 11-15 years and 1 (1.7%) had more than 15 years. The high proportion with less than five years of experience (61.7%) may mirror a high turnover rate or internal rotations among medical officers within health centres.

5.2.2 Diabetes Training Attendance

There were 16 (47%) medical officers who attended at least one UNRWA diabetes training the prior year. Of those, 18 attended 1-2 sessions.

Six medical officers attended diabetes training outside UNRWA facilities. Of those, 4 medical officers attended 1-2, sessions

The quality and more importantly the impact of training have been the object of this KAP audit.

5.2.3 Medical Officer Knowledge of Diabetes Prevalence

Sixty-five medical officers answered: "How many diabetes patients are affected by type 1 diabetes?". Forty (61%) indicated it was less than 10% while 25 (38%) indicated more than 10%. The majority of medical officers have knowledge of the proportion of type 1 and type 2 diabetes. In the clinical audit, 3.6% of patients were affected by type 1 diabetes, and this low proportion was consistent in all 32 health centres that participated.

5.2.4 Diabetes Patient Characteristics (Obesity Percentages)

Sixty three medical officers answered: "How many diabetes patients are obese (BMI ≥ 30)?" Only -5 doctors (7.9%) indicated more than 50%.

In the clinical audit, 65.8% diabetic patients were obese. This is consistent in all 32 health centres. There is a clear lack of knowledge among medical officers of the high prevalence of obesity among diabetes patients. This could result in less intervention or insufficient health education for these patients.

5.2.5 Diabetes Management Knowledge

Sixty-four medical officers responded to: "How many patients are being treated with insulin therapy only. 39 (60.9%) indicated that It was below 20%, while 25 (39.1%) indicated it was above.

In the clinical audit, (9.8%) of patients were treated exclusively with insulin. This proportion has remained below 20% in all 32 health centres engaged in the clinical audit. Medical officer treatment knowledge is quite good. As over 61% answered correctly, this is a good indication of the understanding of diabetes treatment from a clinical standpoint. However, there is still a need for further training.

5.2.6 Insulin Injection Management (Self-Injection)

Sixty-five medical officers answered: "How many patients manage self-injection of insulin?". In the clinical audit, 85% of patients managed insulin by themselves (self-injection). This trend was the same in all 32 health centres. However, only 51 doctors (78%) indicated the correct range of self-injection (i.e. 70-90%). This proportion is low, particularly because UNRWA recommends self-injection.

Moreover, in another question, 11 doctors (17%) stated that they think patients depend on paramedics for insulin injections.

These findings reflect a discrepancy between medical officer perception and patient behaviour. Self-injection percentage is high (80%), but medical officers think it is much lower and that patients may have difficulty managing.

5.2.7 Oral Therapy to Insulin Shift

Medical officers were asked: "When should we shift treatment from oral hypoglycaemic agents to insulin injection?" The responses are shown in Table 35.

Table 35 - Reasons for OHA to Insulin Shift

Reasons	Reply Numbers (Percentages)
Uncontrolled Diabetes	55 (85%)
Complications	50 (77%)
Pregnancy	24 (37%)
Prior to Surgery	14 (22%)
OHA Side Effects	17 (26%)
OHA Noncompliance	20 (31%)
Infection	10 (15%)
Hospitalization	5 (8%)
Specialist Opinion	7 (11%)

Fifty-five medical officers cited uncontrolled status (85%), followed by complications in 50 (77%) responses. These findings are consistent with guidelines and practices in UNRWA health centres.

5.2.8 Diabetes Control Rate

Medical officers were asked: "What is the control rate of diabetes"? In the clinical audit, the overall diabetes control rate was 50.3% using the current UNRWA criteria with 2-hr PPG (180 mg/dl). This percentage (i.e. around 40-50% control rates) is similar in all 32 health centres. Nine (14.1%) indicated less than 40%, 25 (39%) between 40-50% and 30 (46.9%) more than 50%.

Only 39% indicated the correct range of 40-50% control rate, and the remaining 60% indicated lower or higher. Because 46.9% indicated the control rate was more than 50%, this indicates the need for training on the realistic picture and difficulties in diabetes control. This will be particularly important once HbA1c is introduced, as the control rate would be around 32%, which is even lower.

5.2.9 Diabetes Monitoring Labs and Exams

Sixty-four medical officers answered: "How often do you think laboratory examinations like urine protein, cholesterol and creatinine, and fundoscopy should be done for diabetes patients? "The UNRWA Technical Instructions indicate that diabetic patients should have a quarterly urine protein test and annual cholesterol, creatinine and fundoscopy exams.

Correct responses were, respectively 32.8% (21/64), 96.9% (63/65), 93.8% (61/65) and 89.1% (57/64). The responses were in line with the Technical Instructions (almost 80-90% correct).These results were compared with the clinical audit results (percentage of exams performed according to defined frequency).

Test		Clinical Audit Results (Percentages Performed Correctly)	Medical Officer Knowledge (Percentage with Correct Knowledge of Test Frequency)
	Frequency of test		
Urine Protein	Quarterly	91.8%	32.8% (21/64)
Cholesterol	Annually	97.5%	96.9% (63/65)
Creatinine	Annually	98%	93.8% (61/65)
Fundoscopy	Annually	49.2%	89.1% (57/64)

Above findings reflect that Technical Instructions for annual cholesterol and Creatinine measurements are followed. Of great concern was the discrepancy found in practice for patient referral to ophthalmologists. While 89.1% of medical officers reportedly referred patients for annual fundoscopy, the audit revealed only 49.2% were referred.

5.2.10 Diabetes Complications

Medical officers were asked: "What are the common complications of diabetes?" The Technical Instructions define common complications of diabetes as Cerebrovascular Accident (CVA), ischemic heart disease, nephropathy, neuropathy and retinopathy. Medical officers were asked to list common complications of diabetes.

Table 37 - Diabetes Common Complications

Medical Officer Response	Reply Number (Percentage)
Neuropathy	61 (93.8%)
Retinopathy	46 (70.8%)
Ischemic heart disease	46 (70.8%)
Nephropathy	44 (67.7%)
Cerebro-vascular attack	29 (44.6%)
Wrong answers	23 (35.4%)

Among the 65 medical officers who responded, neuropathy was the first complication cited. This confirms the audit findings that peripheral neuropathy is the most common early complication of diabetes patients in UNRWA.

Medical officers ranked nephropathy as fourth (67.7%), although end stage renal failure complication rate was only 0.13%. Twenty three medical officers (35.4%) provided one or more wrong answers for complications. Complications were mixed with signs and symptoms of diabetes and other conditions.

Hyperglycaemia and/or hypoglycaemic coma were not listed as complications. Medical officer knowledge seems to be sufficient, although 35% wrong responses are a concern.

5.2.11 Medical Officer Information (Insulin Acceptability)

Medical officers were also asked why patients sometimes refuse to follow insulin therapy (Table 37).

Table 38 - Medical Officer Perceived Reasons to Refuse Insulin Therapy

Reason	Number (Percentage)
Painful	21 (37.5%)
Depend on Others for Injection	4 (7.3%)
Compli	8 (14.8%)
Unaware of Insulin Advantage	3 (5.8%)
Believe Possible to Manage without Insulin	12 (22.2%)
Unaware of Sequence of Uncontrolled Diabetes	3 (5%)
Causes Hypoglycaemia	3 (5.7%)

The responses were "painful" (37.5%) followed by "believe Possible to Manage without Insulin" (22.2%). What was striking was that "hypoglycaemia" was rarely indicated (3.1%) even though hypoglycaemia was reported by 25% of patients (400/1,600) and by 48.2% of those using insulin. Medical officers may not have a proper perception of patient ideas and fears related to insulin use.

Insulin rejection causes, in particular hypoglycaemia, need to be addressed during counselling sessions with patients and during training for medical providers.

6. Study Limitations

- The audit was designed to cover many aspects of diabetes care provided to refugees.
- The study could not be conducted in Syria due to prevailing armed conflict.
- Except for control status, the audit studied type 1 and type 2 diabetes together and did not go in depth analyzing separate data.
- The study could not analyze outside treatment (why patients go to other health care providers, what treatment they receive, compliance to treatment, etc.).
- The audit did not analyze why among the 787 patients who underwent fundoscopy, UNRWA ophthalmologist examined 299 (38%) and outside ophthalmologist examined 488 (62%)
- The audit did not measure some process indicators such as the number and readings of blood pressure measurements in UNRWA health centers in the prior year and depended only on one reading taken by the audit examiner during the assessment.
- Although HbA1c was the main reference for control status, no previous data was available on control status according to this parameter, so comparisons were not possible. The audit also depended only on the latest reading of 2-hr PPG for control status and did not follow UNRWA Technical Instructions to consider two out of three readings for the prior year.
- The second clinical audit showed that the study population were older, with longer duration of diabetes care, more patients with both diabetes and hypertension, and more prevalence of late complications. These usually have more frequent visits to health centers leading to that patients with poor control have more probability of being selected in this study.
- Knowledge, Attitude and Practice assessments, such as the one conducted among UNRWA Medical officers are subjective and scoring may vary according to experience and practice.

7. Conclusions and Recommendations

The clinical audit of the UNRWA Non Communicable Disease (NCD) care programme, with a focus on diabetes care, was a relevant exercise. It validated the general UNRWA approach to health service delivery and confirmed its capacity to manage diabetes care in a primary health care setting. At the same time, it conducted an in depth assessment of protocols, procedures and performance in NCD care, documenting in particular the strengths of UNRWA diabetes care and, more importantly, some critical shortcomings that will help identify priorities for further improvement.

The availability of competent health staff and of updated, scientifically documented protocols (Technical Instructions) are the main strengths of diabetes care in UNRWA health centres. The clinical audit confirmed that UNRWA medical providers working in diabetes care follow the Technical Instructions rigorously. Diabetes knowledge and care is appropriate as well as the capacity to correctly prescribe lifestyle and drug based treatments. Follow up blood and urine examinations are also conducted regularly as indicated in the UNRWA Technical Instructions.

Clinical management of diabetes was found largely in line with UNRWA Technical Instructions (TIs) on diabetes care, as observed in the first audit. Of 1,600 patients, 42 (2.6%) received lifestyle support only, 1,536 (96%) received diabetes medicines and 22 (1.4%) received treatment from non-UNRWA health facilities. Of those who received medicines, the majority (1,062 or 66.4%) received OHA only, followed by combined therapy of OHA and insulin (340 or 21.3% compared to 14.4% in the first audit), and insulin alone (156 or 9.8% compared to 12.9% in the first audit). Diabetes monitoring examinations are routinely done. Two-hour postprandial glucose, cholesterol, creatinine and urine protein tests were regularly completed for patients (95.9%, 97.5%, 98.0% and 91.7%, respectively).

Profiles of these patients differed little from those of the first audit. They tend to be older than they were in the first audit; 44.4% were 60 years and above compared to only 42.8% in the first audit, with a mean age of 57.1 years compared to 56.6 years, and with longer duration of diabetes care of 8.5 years mean duration of care compared to 7.2 years in the first audit, with 11.8% had duration of care of 15 years or more compared to 6.4% in the first audit, and only 37.3% had duration of less than 5 years, compared to 43% in the first audit.

The second clinical audit showed that the study population were older, with longer duration of diabetes care, more patients with both diabetes and hypertension, and more prevalence of late complications. This population usually have more frequent visits to health centers based on UNRWA technical instructions that patients with poor control should see the doctor and visit the health center monthly, while those with good control visit quarterly. This may result that patients with poor control have higher probability of being selected in this study, and hence the lower control rate and higher rates of late complications found in the second audit compared to the first audit results.

Two main shortcomings were identified. The diabetes control rate among UNRWA patients as a result of HbA1c tests is lower than that measured using the currently applied method of 2-hr PPG (25.1% vs. 50.3%). Control rates are even lower among patients receiving insulin treatment (5.3 % among type 1 diabetes patients). Estimating diabetes control through 2-hr PPG is misleading as it over-estimates.

Control rates. Using HbA1c tests, control rates among UNRWA diabetes patients were found to be low. Improvement is needed for UNRWA diabetes care to be more effective.

At the same time, the control rate based on the HbA1c tests (i.e. <7%) is as low as 25.2%. It was 5.3% for type I patients, 28.3% for Type II patients and 25.0% for patients with diabetes and hypertension. Secondary, the lifestyle issues remain predominant. More than 90% of patients are either obese (65.8%) or overweight (25.1%). Among female patients, the proportion is much higher at almost 94.2%, of which 74.1% are obese. Eye exams, which were supposed to be conducted every year for all patients, were conducted only 49.2% of the patients. A comprehensive and strategic response that goes beyond the activities of the NCD care programme alone is needed to address such fundamental issues. The recently introduced Family Health Team reform offers an ideal framework.

UNRWA's extensive experience in diabetes care in primary health care settings and the capacity, experience and rigour of their medical providers are a solid foundation on which to improve diabetes care. In order to guide further actions aimed at modernizing and broadening diabetes care, action points conducive to addressing priorities for improvement have been elaborated by the UNRWA Health Department.

7.1 Action Points:

UNRWA will take comprehensive and strategic actions to address the fundamental shortcomings identified in the clinical audit by building on the historical capacity of UNRWA diabetes care in 139 health centres and the recently introduced Family Health Team reform.

Quick actions are needed to disseminate the second clinical audit findings within and outside of UNRWA: In 2016, UNRWA should finalize, publish and disseminate the clinical audit findings to all UNRWA Fields and national and international partners.

Dissemination aims to improve awareness of UNRWA's good basic capacity in diabetes care, and also highlight two major shortcomings (control rate and lifestyle support). Ongoing diabetes campaigns in the Fields are excellent opportunities for dissemination.

UNRWA will ensure quick improvement of the identified technical shortcomings, particularly the lack of regular funduscopic examinations for all patients.

Action points

The second clinical audit results indicate two urgent strategic points to address. One is an urgent need to introduce HbA1c testing widely and update the technical instructions accordingly, so as to measure the blood sugar more accurately. The traditional 2-h PPG tests were found not effective. The second is to have comprehensive long-term intervention for healthy lifestyle promotion among Palestine refugees. Such extremely high prevalence of obesity – although it is among diabetes patients and not among ordinary, non-diabetes populations – gives strong warning about continued rise of diabetes among Palestine refugees. On top of the maintenance of the good progress and performance in UNRWA's diabetes care, such urgent actions are much needed.

Accordingly the Strategic action points recommended are as follows:
- Develop comprehensive healthy lifestyle promotion strategy addressing all aspects on risk factors (diet, exercise and smoking) comprehensively & strategically, based on evidence, during the course of 2016, so as to implement the strategy by end 2016.
- Improve diabetes monitoring mechanisms through introduction of HbA1c testing and updating the technical instructions during the course of 2016.
- Prevention activities for populations at risk of diabetes and other comorbidities: expansion of partnerships with local, national and international stakeholders.
- Strengthen staff capacity development in all areas, including nurses and other paramedical staff. Focus on proactive diabetes care delivery for health promotion, education and adherence. This may require redefining roles and duties.

7.1.1 Develop comprehensive healthy lifestyle promotion strategy

There is addressing all aspects on risk factors (diet, exercise and smoking) comprehensively & strategically, based on evidence, during the course of 2016, so as to implement the strategy by end 2016.

Expand partnerships with local, national and international stakeholders. a need to highlight the importance of lifestyle support in light of the extremely high obesity and overweight rates among type 2 diabetes patients. Lifestyle support campaigns need to be expanded and, more importantly, institutionalized. A comprehensive package of lifestyle support activities are needed that can be implemented in health centres.

7.1.2 Improve diabetes monitoring mechanisms

The introduction of HbA1c testing, glucometers (for self-monitoring) and new medicines like statins are critical for the improvement of UNRWA diabetes care. It is unfortunately obvious that the current 2-hr PPG may not enable an optimal improvement of diabetes care. Such technologies and medicines are significantly expensive for UNRWA and need to be well prepared for and strategized.

- UNRWA will develop a stepwise implementation plan for the introduction of modern technologies (HbA1c) and medicines (statins) for patients who need and would benefit from them the most.
- Based on the possible stepwise introduction of new technologies and medicines, UNRWA will update the current Technical Instructions accordingly.

7.1.3 Comprehensive Prevention Activities

Comprehensive prevention activities for the general population at risk of diabetes and other comorbidities are critical. UNRWA will continue to care for patients living with diabetes. However, unless diabetes primary prevention is boosted, this effort will become overwhelming (both technically and financially) due to the increase in patients. There is a need for a comprehensive package of prevention activities which is doable with less cost implications as the backdrop of the ongoing diabetes campaigns. Partnerships are essential. UNRWA primary health care centres cannot make any decisive improvement in diabetes prevention and care by themselves.

7.1.4 Staff Capacity Development

Staff capacity development is the most critical strategic point. The clinical audit indicated a good knowledge of diabetes care among medical providers. However, there are shortcomings, particularly for lifestyle support and activities.

Before the introduction of new technologies and medicines, medical providers need proper training, particularly on HbA1c testing as it will drastically change the control status of patients and thus the need for counselling and changes in medical treatments.

8. Annex 1: Patient Data Collection Form

WDF/UNRWA CLINICAL AUDIT ON DIABETES CARE

Data Collection Form

Basic Patient Data

Field [   ]

H/C [   ]   Centre ID [   ]   NCD No [   ]

Patient [   ]   Initials [   ]   Year of Birth [   ]

Year [   ]

SEX: Male [   ]   Female [   ]   Treated for diabetes in this clinic since:
[   ]

Residence: In Camp [   ]   out Camp [   ]

Type of Dm/Risk Factors

Type 1   Smoker: yes   No   Ex

            Alcohols   yes   No   UK

Type 2

DM &HTN

Measurement

Weight (Kg) (last visit)   Height (cm)   BMI   waist   Blood Pressure (sitting)
mm/hg

[   ]   [   ]   [   ]   [   ]   [   ]

Most recent within last 12 months

FPG (mg/dl: ....   Fasting Cholesterol (mg/dl: ....

2hr,PPG(mg/dl): ....   Fasting HDL Chol(mg/dl) : ....

No of BG Measurement: ....   Fasting triglyceride(mg/dl): ....

Hb1c done in 12 months   Yes   No   If Yes HBA1C

Serum Creatinine Tested   Yes   No   If Yes .... mg/dl

Urine albumin   Yes   No   If Yes Result   Neg + ++ more

Diabetes Complications

Legal Blindness   yes   No   UK

Fudoscopy   yes   No   UK

                Yes   No   UK   If yes Self   Referred

Background Retinopathy   Yes   No   UK

Advance Diabetic Eye Disease (specify)   Yes   No   UK

Absent Foot Pulse   Yes   No   UK

Acute Ulcer/Gangrene   Yes   No   UK

Healed Ulcer   Yes   No   UK

Peripheral Neuropathy   Yes   No   UK

Amputation   If Yes AK   BK   Toes

Hypertension   Yes   No   UK   If Yes Treated

Untreated

Cerebral Stroke   Yes   No   UK

MI/Angioplasty   Yes   No   UK

End Stage Renal Disease   Yes   No   UK   If Yes Transplant

Dialysis

Skin Infections   Yes   No   UK   If Yes Bacterial   Fungal

Hypoglycaemia   Yes   No

                    If yes – Number of Episodes Last month   Last 1 year

Documented by Blood sugar   [   ]

Based on symptoms alone   [   ]

Requiring third party assistance   Yes   No

Current Medication

Diabetes   Yes   No   If Yes OHA   Insulin   Others

                                        If OHA Glibenclamide Gliclazide   Metformin

                                        Others ....   Traditional Herbal Medicine

                                        If Insulin   Number of injection per Day

                                        Dose units/day   Syringe   Pen

                                        Injection Self   Assisted by family   Assisted by

paramedics

Hypertension Yes   No   If Yes ACE Inhibitors   B Blockers   Ca antagonists

                                        a Blockers   Diuretics   Others

Hyperlipidemia   Yes   No   If Yes   Statins   Others .... From where?

.MOH / Private / Others

Self –Monitoring and Education

Home Blood Glucose   Yes   No   UK   If Yes -1 Fast blood Glucose

                                                        - 2 hr. blood Glucose

Home urine Glucose   Yes   No   UK   If Yes -1 Fast urine Glucose

                                                        - 2 hr. urine Glucose

Number of Home Urine Glucose/month ....

Number of Home Blood Glucose/month ....

Education episodes last year   1   2   3   4   5

Education   Diet   Hyperglycemia   Exercise   Foot care

Chronic Complications

                Hypoglycemia   Others   UK

Physicyan (Compulsory)

.... / .... / ....   Signature   of   Physician

Date Month   Year

Instructions
1- Write in English
2- Prefer Blue/Black Point Pen
3- One character in one Box
4- Do not write outside the boxes
5- Cross(X) only one
6- The Centre ID will be filled by the person supplying the forms
7- You have to enter only the patients three letter initials in the boxes provided
8- If only the patients Age is known instead of date of birth, please calculate the approximate year in the boxes
9- For all measurements enter the values right justified. For example, if the weight is 75kg, enter if as:
075.0 or 75.5
10- DO NOT USE PHOTOCOPY OF THIS FORM

9. Annex 2: Questionnaire for Medical Officers on Knowledge, Attitude and Practice (KAP)

Age .... Sex ....

Qualification..

Years of Practice .... Years of active Diabetes(NCD) Practice..............................

Educational Programs /Conferences attended in last two years. Specify

- Workshop ....
- Courses ....
- Conferences ....

No. of patients seen/day .... No. of diabetic patients seen/day..........................

No. of new diabetics seen/week ....

Proportion of patients with different type of Diabetes

- Type1   .... %
- Type2   .... %
    - Norma   .... %
    - Overweight   .... %
    - Obese   .... % Others
                                         .... %

Proportion of patients receiving different forms of treatment for diabetes

- Diet and Exercise only   .... %
- Oral drugs only   .... %
    - Glibenclamide   .... %
    - Gliclazide   .... %
    - Metformin   .... %
    - Combination of two or more   .... %
- Insulin only   .... %
- Combination of insulin and oral drugs   .... %

Proportion of your insulin using patients who

- Self inject   .... %
- Depend of family   .... %
- Depend on paramedics   .... %

Proportion of patients using Insulin

Average vials per month/Patient   ....

Proportion of patients who self-monitor at home

- Blood Glucose   .... %
- Urine Glucose   .... %

Proportion of patients who monitor at UNRWA clinic only

- Blood Glucose   .... %
- Urine Glucose   .... %

Frequency of blood glucose monitoring: Proportion of patients who monitor blood glucose

- Several times a day   .... %
- Once a day   .... %

- Once a week .... %
- Monthly .... %
- Bimonthly .... %
- Quarterly .... %
- Half yearly .... %
- Once a year .... %

When advising monitoring you recommend / rely more on

- FBS
- 2h PPG
- RBS
- OGTT

How often do you advice the following tests for your patients with diabetes

Test   Frequency e.g., never, monthly; weekly, yearly etc

- Hb1AC(outside UNRWA) ....
- Serum Cholesterol ....
- Serum triglycerides ....
- S. Creatinine ....
- Urine sugar and proteins ....
- ECG ....
- Chest X-ray ....
- Fundoscopy ....

How often do you check for the following in your patients with diabetes?

- Examination   Frequency e.g., never, monthly; weekly, yearly etc
- Foot Pulses ....
- Foot Sensation ....
- Blood Pressure ....
- Injection site ....
- Compliance to diet ....

Your patients are provided education/information about diabetes. Tick the box/s that best describes the situation in your clinic

- Never
- Always at the first visit
- At each visit
- As and when required
- When the patient asks questions
- When a patient develops a new problem

Who provides the education? ....

Name four most common clinical problems (among your patients) that you encounter in your practice?

....

....

....

....

....

Tick three of the following statements that best describe your practice on review of treatment options
- Every visit
- When blood sugar values are high
- When patient is symptomatic
- When a new complication sets in
- When patient develops side effects
- Every year based on results of annual checks
- When a new potentially beneficial therapy is introduced

How often do you refer your diabetic patients to other doctors (Specialist)?
- Always (at least 3 referrals per year)
- Never (Zero referral)
- Sometimes (one or two referrals per year)

Most common referrals are to:
 (tick the applicable)
- Ophthalmologists
- Diabetologists
- Nephrologists
- Cardiologist
- Gynaecologist
- Neurologist
- Others. Specify
- ....

When people are diagnosed to have diabetes what are the common problems/symptoms they present to you with
- Routine check / Pre surgical check   .... %
- Not feeling well/ Vague symptoms   .... %
- Tiredness / Bodyache   .... %
- Overweight   .... %
- Classic symptoms of diabetes   .... %
- Symptoms suggestive of complications   .... %
- Symptoms of associated conditions
 Tuberculosis; hypertension; CAD etc   .... %

Name the five most common complications of diabetes that you see in your practice?
- ....
- ....
- ....
- ....
- ....

You set goals and targets for control. Give values in the below table which according to your practice standard signify Good, Satisfactory and Poor control

Parameter	Good	Satisfactory	Poor
• FBS			
• 2HPPG			
• HbA1c			
• BP			

You modify the patients' treatment from time to time. In your view what % of your patients every year move from OHAs to Insulin ....

Reasons

- ....
- ....
- ....
- ....
- ....

Insulin to OHAs .... %

Reasons

- ....
- ....
- ....
- ....
- ....

Arrange the following reasons why patients resist insulin therapy even when they should be on it, in order of importance according to you

- It is painful
- It is complicated and difficult to understand
- It causes hypoglycemia
- Because they have to depend on someone to inject
- Because they are unaware of its advantage
- Because they are unaware of the consequences of uncontrolled diabetes
- Because others tell them they can manage without insulin

Arrange the following reasons why patients resist home monitoring, in order of importance according to you

- It is unnecessary
- It is costly
- It is painful
- It is unreliable
- To complex for them to understand
- They are afraid

Do you have anyone of the following to assist you in your diabetes practice?

- Dietician
- Nurse /Educator
- Podiatrist

How frequently do your patients visit you?

Frequency	Proportion of patients
• Weekly	.... %
• Monthly	.... %
• Bimonthly	.... %
• Quarterly	.... %
• Half yearly	.... %
• Yearly	.... %

Indicate the proportion patients managed by you for different duration of time

Frequency	Proportion of patients
• < 1 year	.... %
• >1 <3 years	.... %
• >3<5 years	.... %
• >5<7 years	.... %
• >7<10 years	.... %
• >10 years	.... %

Tick what apply, the reasons why patients do not comply with given instructions
- They cannot understand the instructions/ reason
- It is an attitudinal problem
- Changes required are too much to cope with
- No family/ societal support/resources
- They seek alternate sources/ are lured by alternate sources
- Doctors are unable to provide time/understanding/proper knowledge
- They are uneducated/poor
- They don't care till complications set in.

According to already used criteria for control status of Diabetes ,patients can be rated as having
- Controlled .... %
- Uncontrolled .... %

In terms of BP control proportion of patients in your practice that can be rated as having
- Controlled .... %
- Uncontrolled .... %

In your view what proportion of your diabetic patients, (more than 1 year with you) have the following
- BMI > 25
- S.Triglycerides > 150mg/dl
- S. Cholesterol > 200mg/dl
- S Creatinine > 2mg/dl
- BP above 140/90 mm of Hg
- Retinopathy
- Peripheral Neuropathy

10 Annex 3: UNRWA flow chart for the management of diabetes mellitus

Failure of non-pharmacological measures, (education, diet and excercise) within 2 - 4 months

↓

Reassess lifestyle interventions to maximize benefits

↓

BMI ≥ 30

Monotherapy

No →

Start either:
1. <u>Glibenclamide</u> 2.5-5 mg once daily, increasing dose to maximum daily dose 20 mg (two divided doses)
2. <u>Metformin</u> 500 mg once daily, increasing dose over 3-4 weeks (maximum daily dose 3 grams in divided doses (3 times/day)
3. <u>Gliclazide</u> 40-80 mg once daily, increasing to maximum of 320 mg over 3-4 weeks doses higher than 160mg should be divided.

Monotherapy

Yes →

Start metformin 500 mg once daily, increasing dose over 3-4 weeks (maximum daily dose 3 grams in divided dosage (3 times/day)

↓

3 months

↓

Repeat 2-h PPG
Re assess and modify lifestyles

↓

Is blood glucose controlled?

← No **Combination Therapy**

2

Yes → **Continue Regimen**

```
                          ( 2 )
                            │
                            ▼
  ┌─────────────────────────────────────────┐
  │          Combination Therapy            │
  │    Add any of the following agents:     │
  │  Sulphonyurea (Gliclazide, glibenclamide)│
  │     with  biguanides (metformin)        │
  │     (Do not combine glicazide and       │
  │            glibenclamide)               │
  └─────────────────────────────────────────┘
                            │
                            ▼
                   (    3 months    )
                            │
                            ▼
  ┌─────────────────────────────────────────┐
  │     Repeat 2-h PPG  Reassess and        │
  │            modify lifestyle             │
  │                                         │
  └─────────────────────────────────────────┘
                            │
                            ▼
      [No]          ╱ Is blood glucose ╲        [Yes]   ┌──────────────┐
       ◄───────────   controlled?       ────────────►   │   Continue   │
       │            ╲                  ╱                 │   Regimen    │
       ▼              ╲──────────────╱                   └──────────────┘
  ┌─────────────────────────────────────────┐
  │ Add insulin therapy (e.g. 10-15 units   │
  │ evening doses) + OHA, one of            │
  │ Sulphonyureas (Gliclazide, glibenclamide)│
  │ and/or Biguanides (metformin)           │
  └─────────────────────────────────────────┘
                            │
                            ▼
                   (    3 months    )
                            │
                            ▼
  ┌─────────────────────────────────────────┐
  │     Repeat 2-h PPG  Reassess and        │
  │            modify lifestyle             │
  └─────────────────────────────────────────┘
                            │
                            ▼
┌──────────────┐  [Yes]  ╱ Is blood glucose ╲   [No]
│   Continue   │ ◄───────   controlled?      ────────┐
│   Regimen    │         ╲                  ╱        │
└──────────────┘           ╲──────────────╱          ▼
                                        ┌──────────────────────┐
                                        │ Switch to insulin Therapy│
                                        │    1-3 times daily    │
                                        └──────────────────────┘
```

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